

# Effective Protective Rates of Korean Industries

**Korean Development Association**

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**June, 1967**

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## P R E F A C E

The Korean economy with its high rate of growth and rapid expansion of exports in recent years, is increasingly assuming an active role in international society. Public awareness of the need for freer trade in Korea is increasing, especially since the Government formally became a member of GATT early in 1967.

Trade liberalization or tariff concessions, however, will have to be based on a re-evaluation of home industries in relation to their competitive capability in the world market. A first step in this task is the estimation of the full protective effects of tariffs and other protective measures.

In recent protection theory, the net effect of protective policies on various stages of domestic production has come to play an important part. As yet, however, there have been few empirical applications concerning the level of effective protection, particularly for developing countries such as Korea (exceptions include studies for Argentina, Pakistan and the Philippines). It is for this reason and to provide a sound framework for the reformulation of trade policies in Korea, that we began this study.

In this study, we attempt to make an overall estimate of effective protective rates of all sectors producing physical goods. Since this procedure included many industries, producing some 2,000 items, we experienced many difficulties in methodology and computation. For example, the basic formula for computing the effective rate of protection, which was derived from a relatively new theory, had to be modified somewhat to conform to available statistics; and the computational procedures underwent many revisions.

We are greatly indebted to the many people in the United States Operations Mission to Korea, who have helped us in financing and developing this report. Special thanks are due to Mr. Roger D. Norton and Mr. William V. Rapp of the Economics Branch of the Program Office, USOM, for leading us through the above difficulties and shortcomings. Mr. Rapp was so kind as to let us use as an integral part of this report his valuable work on "Biases in our Estimates of the Effective Protective Rates versus the Real Rates" and "Some Normative Aspects of Tariffs".

In Sang Song

President

Korean Development Association

Seoul, June, 1967

# ERRATA

| Page  | Line | Wrong           | Correct          |
|-------|------|-----------------|------------------|
| 6     | 17   | calculatiog     | calculating      |
| 6     | 27   | competive       | competitive      |
| 11    | 22   | 3. 9%           | 2. 9%            |
| 15    | 2    | 31 st           | 32 nd            |
| 15    | 2    | 83. 6%          | 83. 4%           |
| 15    | 6    | 17. 31%         | 26. 75%          |
| 15    | 19   | advaced         | advanced         |
| 15    | 23   | bicyles         | bicycles         |
| 18    | 4    | U               | U <sub>j</sub>   |
| 29    | 26   | It for instance | If for instance  |
| 34    | 32   | depelopment     | development      |
| 35    | 17   | much large than | much larger than |
| 37    | 6    | .... st data    | latest data      |
| 37    | 17   | competive       | competitive      |
| 82-85 | 1    | $v'_j$          | $v''_j$          |

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# I. Effective Protective Rates

## 1. The Basic Concepts & Definitions

Industries of all nations, developed or developing, are protected with tariff barriers, although the degree of protection differs from nation to nation. A frequently stated rationale for the tariff system is the protection of infant industries. The exact level of tariff rates, however, usually are determined by arbitrary and political considerations. Such considerations are influenced by a nation's industrial structure and its position in the international economy as well as a particular industry's need to be protected. They are also often responsive to the tariff structures of a country's trading partners. In other words, a change in the tariff structures of a nation may result in corresponding changes in that of other nations. Thus, the tariff structures of nations are interrelated, and there is a need to develop a way of measuring the degree of protection, to facilitate both international comparisons and domestic policy formulation.

The use of such a measurement technique can also be extended to a comparison among industries within a nation. Only through assessment of total effective protection for each industry can judgments be made regarding the degree of correspondence between the rate of protection and the need for protection. Net or actual degree of protection to industries may also show the effect of tariffs on resource allocation.

The height of a tariff as an index of its restrictive effect has had a long history of investigations, using more or less ingenious methods. Estimates of the height of national tariff levels are made to compare the restrictive effect of duties on trade flows. Tariffs affect the pattern of production and consumption in a general equilibrium framework. Under a *ceteris paribus* assumption, in the long-run duties generally reduce both imports and exports under full employment conditions, since they cause changes in relative prices and thus induce shifts of resources from export industries to import-competing industries, and make exports less competitive by raising the cost of factors of production.

However, empirical studies of the effect of tariffs on imports have been focused on the height of protective or restrictive rates. Traditional international comparisons of the height of tariffs restricted to the exchange of an individual product, however, face the serious problem of not allowing for the effect of duties on raw materials and intermediate products on the protection of goods at higher stages of processing.

It is easy to understand that high duties on raw materials will reduce the degree of protection accorded to final goods, by increasing the cost of inputs. Therefore, the nominal and effective rates of tariffs frequently differ considerably, and it is very important to distinguish between

them.

Helped by the recent development of input-output analysis, a theory of the protective effects of tariff structures has been developed. Examining the "Effective Protective Rate", or "Effective Rate of Protection", recent contributions to the new tariff theory recognize that a tariff on goods used in a productive process is equivalent to a tax on the output of that process, while the traditional theory of tariffs assumes that only final consumption goods are protected and that they are produced entirely with primary factors of production unaffected by the tariff structure.

The net effects of the tariff structure give the degree of protection offered to the various stages of production within the input-output structure. It can be evaluated by taking account of both the height of tariff on outputs and the height of tariff on inputs. By taking account both of the effect of price increases stemming from tariffs on outputs and of the cost push effect from tariffs on inputs, the degree of protection to the value added by that industry can be calculated. The existence of protection means that the value added per unit of the output in the domestic industry can exceed the value at the world prices due to the presence of a tariff. Both tariffs on outputs and tariffs on inputs affect this value added (in opposite directions).

Thus, the effective protection rate is defined as the percentage increase in value added per unit of an industry due to tariff protection, or the ratio of the value added of an industry under tariff protection to the value added of the same industry in the absence of tariff protection (i. e. at world prices). For example, if value added of an industry in the absence of tariff protection was 100 and that under tariff protection 120, then, the effective protection rate of the industry would be 20%. It is important to see the way in which the increase by 20% of value added occurs. This increase in value added depends not only on the tariffs designed to protect the specific domestic output, but it also depends on the tariffs affecting importable inputs and thus the value of input coefficients.

The relevant theoretical contributions have been made mainly by Clarence W. Barber, W. M. Corden, William P. Travis, Harry G. Johnson, Bela Balassa, Giorgio Basevi, Stephen R. Lewis Jr. and Stephen E. Guisinger.

In calculating effective protection rates under a given exchange rate it will have to be assumed<sup>①</sup> that (1) the physical input coefficients are all fixed under relative price variations; that is to say, fixed physical proportions are maintained between each material input and output; (2) the elasticities of demand for all exports and supply of all imports are infinite; (3) the internal producer's price of each importable is given by the world market price plus nominal tariff; and (4) primary factors, such as labor and capital, are immobile internationally.

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① W. M. Corden, "The Structure of a Tariff System and the Effective Protective Rate," *Journal of Political Economy* LXXIV.

G. Basevi, "The U.S. Tariff Structure; Estimate of Effective Rates of Protection of U.S. Industries and Industrial Labor", *Review of Economics and Statistics*, June 1966.



The formula for the effective protective rate can, then, be derived as follows:

- $V_j$  : value added in industry j in absence of tariffs (i.e. at world prices);  
 $X_j$  : value of output of industry j in absence of tariffs;  
 $X_{ij}$  : value of the input of good i into industry j in absence of tariffs;  
 $v_j$  : value added in industry j per unit of output of j in absence of tariffs;  
 $a_{ij}$  : value of the input of good i per unit of the output of j in absence of tariffs;  
 $V'_j$  : value added in industry j in presence of tariffs (i.e. at producers' prices);  
 $X'_j$  : value of output of industry j in presence of tariffs;  
 $X'_{ij}$  : value of the input of good i into industry j in presence of tariffs;  
 $v'_j$  : value added in industry j in presence of tariffs per unit of output of j;  
 $a'_{ij}$  : value of the input of good i per unit of output of j in presence of tariffs

$$\left( = \frac{a_{ij}(1 + t_i)}{(1 + t_j)} \right);$$

- $X''_j$  : value of output in presence of tariffs and commodity taxes (domestic market prices);  
 $X''_{ij}$  : value of the input of good i into industry j in presence of tariffs and commodity taxes;  
 $v''_j$  : value added in industry j per unit of output in presence of tariffs and commodity taxes;  
 $a''_{ij}$  : value of the input of good i per unit of output of j in presence of tariffs and commodity taxes;  
 $v_j^*$  : value added ratio in presence of tariffs at world prices;  
 $T_{dj}$  : amount of commodity tax on domestic product of j;  
 $t_j$  : total rate of duties on import of products ( $t_j = t_j^1 + t_j^2$ ); ②  
 $t_i$  : total rate of duties on import of inputs ( $t_i = t_i^1 + t_i^2$ ); ②  
 $t_j^1$  : nominal rates of tariff on import of products;  
 $t_i^1$  : nominal rate of tariff on import of inputs;  
 $t_j^2$  : special customs duty rates on import of products;  
 $t_i^2$  : special customs duty rates on import of inputs;  
 $t_j^3$  : commodity tax rates on import of products  $\left( = \frac{T_{dj}}{X_j} \right)$ ;  
 $t_i^3$  : commodity tax rates on import of inputs;  
 $t_{dj}$  : commodity taxes on domestic product j, per unit of output of j, in presence of tariffs and commodity taxes  $\left( = \frac{T_{dj}}{X''_j} \right)$ ;

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② Commodity tax only used in formula to convert market prices to producer's prices.

In absence of tariffs, value added in industry  $j$  at world prices may be derived from production functions<sup>③</sup> as follows

$$V_j = X_j - \sum X_{ij} \quad (i = 1, 2, \dots, n) \dots\dots\dots(1)$$

or

$$v_j = 1 - \sum a_{ij} \quad (i = 1, 2, \dots, n) \dots\dots\dots(1')$$

Value added in producers' prices in industry  $j$  made possible by the tariff structure may be expressed as

$$V'_j = X_j(1 + t_j) - \sum X_{ij}(1 + t_i) \dots\dots\dots(2)$$

$$= X'_j - \sum X_{ij}(1 + t_i) \dots\dots\dots(2')$$

or

$$\begin{aligned} v'_j &= 1 - \sum a'_{ij} = v''_j - t_{dj} \\ &= 1 - \sum \frac{a_{ij}(1 + t_i)}{1 + t_j} \dots\dots\dots(2'') \end{aligned}$$

where  $v''_j$  is value added at market prices, including commodity taxes.

From (1') and (2'') or from (1) and (2) the effective protective rate,  $F_j$ , is defined as

$$F_j = \frac{V'_j - V_j}{V_j} = \frac{v^*_j - v_j}{v_j} = \frac{v^*_j}{v_j} - 1 \dots\dots\dots(3)$$

$$= \frac{t_j - \sum a_{ij} t_i}{v_j} \dots\dots\dots(3')$$

where  $v^*_j$  is the value added ratio in the presence of tariffs at world prices and equals  $1 + t_j - \sum a_{ij}(1 + t_i)$ .

Formula (3') is the common and basic concept of the effective protective rate. The expressions show that the height of the effective protective rate depends on the size of  $a_{ij}$  and  $v_j$ , which are parameters in a technical production function, and on the height of the tariff rates on products,  $t_j$ , and on inputs,  $t_i$ .

Formula (3') can also be written as<sup>④</sup>

$$F_j = \frac{t_j - \sum a_{ij} t_i}{v_j} = t_j + \frac{(t_j - \bar{t}_j) \sum a_{ij}}{v_j} \dots\dots\dots(3'')$$

where

$$\bar{t}_j = \frac{\sum a_{ij} t_i}{\sum a_{ij}} \quad (i = 1, 2, \dots, n)$$

This expression shows the relationships between the tariff rates on output ( $t_j$ ) and effective protective rates ( $F_j$ ).

a)  $F_j = t_j$  if and only if  $t_j = \bar{t}_j$ .

In words, the effective protection rate is equal to the nominal tariff rate on output (to be con-

③ Refers to production function in input-output theory.

④ G. Basevi, op. cit.

crete, the tariff rate on import of same commodity as the product of industry j) if the weighted average of nominal tariff rates on the inputs is equal to the nominal tariff rate on the output. In other words, value added in industry j is protected to the same degree as the tariff rate on its output only if  $t_j = \bar{t}_j$ . Tariff on output gives a positive protective effect while that on inputs gives negative protective effect, accordingly, input coefficients are neutral only when  $t_j = \bar{t}_j$ .

b)  $F_j > t_j$  if and only if  $t_j > \bar{t}_j$

The effective protective rate is higher than the tariff rate on output when the weighted average tariff rate on the inputs is lower than the tariff rate on output.

c)  $F_j < t_j$  if and only if  $t_j < \bar{t}_j$

This is the converse to b) above. The effective protection rate is lower than the tariff rate on output where the negative protection effects caused by duties on the inputs are larger than the positive effect of protection on output. And in the case of  $t_j < \sum a_{ij} t_i$  (or  $\bar{t}_j > \frac{t_j}{\sum a_{ij}}$ ) the effective protective rate becomes negative, meaning the value added in absence of tariffs is larger than the value added in presence of tariffs.

d)  $F_j = \frac{t_j}{v_j}$  if  $\bar{t}_j = 0$  (or every  $t_i = 0$ ) or  $F_j = \frac{-\sum a_{ij} t_i}{1 - \sum a_{ij}}$  if  $t_j = 0$

These formulas show the two extreme cases: The former is the condition for which the effective protective rate reaches the maximum level set by the tariff while the latter reaches the minimum level set by the degree of cost push.

## 2. Modification of Formula and Data Used

The foregoing concepts and formulas for effective protective rates are presented in order to trace its theoretical development. They, however, do not lend themselves to an actual calculation of effective protective rates. In order to proceed with the practical calculation, modifications of the formula are necessary since the data available have several associated problems to be overcome.

The first problem relates to the coverage of various duties affecting the effective protective rates. According to the basic concept, only the structure of actual tariffs is involved. But, in reality, protection is affected not only by tariffs but also by export taxes, indirect taxes, subsidies and other measures such as preferential credits from financial institutions. The effective protective rate may be calculated allowing for all these positive or negative protective influences.

The effective rates of protection can be evaluated separately for capital or labor used in addition to a sector's value added. Since we are interested here only in the degree of protection for each sector's value added, however, the rate for capital or labor is set aside for future study.

Consideration on the treatment of commodity taxes included in value added is also another point of importance. The objective of estimating effective protection is to obtain value added at domestic

producers prices over that at world prices. The commodity tax on imports should not be included as part of protective duties because we have tried to separate the net effects of the tariff system from the net effects of the tax system and other negative and positive subsidies. In the 1963 Korean Input-Output table, however, the portions of the commodity tax that are collected from imported goods are separated from their respective cells and are included in the commercial margin. Since there is difficulty in bringing these portions back to their respective cells in order to fit our formula, and as the amounts involved are not substantial, we used the input coefficients as they are.

Protective instruments are defined to include tariffs and special customs duties. For the sake of convenience, the commodity tax as mentioned above is excluded from the value added and reckoned to be included in inputs. Much effort was made to collect data on the protective effects of subsidies and credit policies such as export credit or domestic usance. But these data were found insufficient and not decisive so that we did not consider them. As for the special customs duties which have no fixed rates, the rates are calculated on the basis of the amount of duties collected and on the value of imports.

The second question that arises concerns the treatment of non-tradables. Controversy still exists in calculating effective protective rates for tradables: Whether non-tradable inputs should be treated like primary factors or whether they should be treated in the same way as tradable inputs with zero tariff rates. W.M. Corden favors the former while G. Basevi, R. Lewis and S.E. Guisinger the latter.

Concerning this argument, no conclusion has yet been reached.<sup>⑤</sup> Since the development of this conceptual difference is not the object of this study, we simply decided to follow W.M. Corden. For convenience sake and to avoid the computation of non-tradables as a sector, we include non-tradables, such as construction, electricity, water works and sanitation, commerce, railroad transportation and other services in value added.<sup>⑥</sup>

The third problem that is raised concerns using the 1963 I—0 table, where imports are classified into competitive or non-competitive imports, and how to treat non-competitive imports.

In the case of non-competitive imports, it is assumed that a tariff is levied only for revenue purposes and not as a protective measure since there exists no domestic industry producing them. However, the weighted average of rates for non-competitive imports is taken into account as an input sector.

The last and most important problem is how the formula shall be modified so as to solve satisfactorily all the foregoing practical questions and problems.

If we compute the effective rates of protection for one product as an industry, there will not be

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⑤ W.M. Corden op. cit., Also see. S.R. Lewis Jr. and S.E. Guisinger, "Measuring Protection in a Developing Country; the Case of Pakistan", Appendix on Method, December, 1966,

⑥ W.M. Corden op. cit.

a weighting problem and  $t_j$  and  $t_i$  will be the same for both output and input.

Attempting to calculate the rate for grouped industrial sectors, we were faced with aggregation problems in actually computing tariffs for each I—0 sector. We calculated two sets of tariff rates by a 270 I—0 sector base weighted by the output of each commodity on the one hand, and weighted by the imported amounts of each commodity for inputs on the other.

We adopted for  $t_j^1$  nominal tariff rates weighted by output and for  $t_i^1$  actual nominal tariff rates collected weighted by imports. It seems that nominal tariff rates should stand for  $t_j^1$  since it is the factor playing a major role in raising domestic prices of the commodity, which both domestic producers and importers should take into account for their cost accounting. Meanwhile, the reason why actual tariff rates weighted by the imports amount were adopted for tariff rates on inputs,  $t_i^1$ , is explained by the fact that input costs of a certain industry will be raised chiefly by actual tariffs rates paid. In fact, the tariff exemption on the end-user's imports for their inputs occupy a heavy weight in total imports in Korea. The rates paid are components of their actual costs for their outputs. The same concept was used in determining  $t_j^2$  and  $t_i^2$  in order to obtain  $t_j$  and  $t_i$ .

Input coefficients and value added per unit of output are obtained from the I—0 tables for 1963, compiled by the Bank of Korea. In order to calculate the adequate effective protective rate, the 270 x 270 matrix is reformulated into 218 x 317 sectors by subdividing inputs of the 270 sector base.

Under these principles, we modified the basic formula as follows:

Value added at world market prices, as shown by equation (2), will be

$$V_j = X_j - \sum X_{ij} \dots\dots\dots(4)$$

or

$$v_j = 1 - \sum a_{ij} \dots\dots\dots(4')$$

and it includes the inputs for non-tradables, but commodity taxes are assumed not to be included in world market prices.

Value added at domestic market prices, if  $t_j$  and  $t_i$  include commodity taxes ( $t_j^3$  and  $t_i^3$ ) as well as customs duties, will be:

$$V''_j = X_j (1 + t_j) - \sum X_{ij} (1 + t_i) \dots\dots\dots(5)$$

$$= X''_j - \sum X''_{ij} \dots\dots\dots(5')$$

or

$$v''_j = 1 - \sum a''_{ij} \dots\dots\dots(5'')$$

Inputs for non-tradables and commodity taxes are included in value added,  $V''_j$ . It should be noted that  $t_j$  (or  $t_i$ ) includes not only tariff rates but also special customs duties, and commodity taxes. Both the prices of imported goods and of domestic products are raised by commodity tax rates, compared with world market or producer's prices. This means that  $X''_j$  or  $X''_{ij}$  are valued

in terms of domestic prices including the commodity tax as in Korea's I-0 Table.<sup>⑦</sup> Because of inclusion of tariffs and commodity taxes,  $v''_j$  in equation (5'') does not represent the value added per unit of output at domestic prices as seen by the producers but does represent the value added seen by the economy. Subtracting  $\frac{T_{dj}}{X''_j}$ , we arrive at  $v'_j$  (6) as value added in industry  $j$  per unit of output of  $j$  in presence of tariffs at producer's prices and as seen by the producer.

$$v'_j = 1 - \frac{T_{dj}}{X''_j} - \sum a_{ij} \frac{1 + t_i}{1 + t_j} \dots\dots\dots (6)$$

$$v'_j = 1 - \sum a''_{ij} - t_{dj} \dots\dots\dots (6')$$

where

$$v'_j = v''_j - t_{dj}, \quad a_{ij} \frac{1 + t_i}{1 + t_j} = a''_{ij},$$

and

$$\frac{T_{dj}}{X''_j} = t_{dj}, \text{ provided } t_i \text{ and } t_j \text{ now include commodity taxes.}$$

And  $v^*_j$  now equals

$$(1 + t_j) - \frac{T_{dj}}{X_j} - \sum a_{ij} (1 + t_i) \dots\dots\dots (6'')$$

The concepts of  $v'_j$  and  $a''_{ij}$  in equation (6'), are consistent with those of the I-0 table in which value added per unit of output was valued at domestic market prices *including* the commodity taxes.

Combining the equation (1'), (3) and (6'') the effective protective rate,  $F_j$ , is simply derived as<sup>⑧</sup>

$$\begin{aligned} F_j &= \frac{v^*_j}{v_j} - 1 = \frac{(1 + t_j) - \frac{T_{dj}}{X_j} - \sum a_{ij} (1 + t_i)}{1 - \sum a_{ij}} - 1 \\ &= \frac{v''_j - t_{dj}}{\frac{1}{1 + t_j} - \sum \frac{a''_{ij}}{1 + t_i}} - 1 \dots\dots\dots (7) \end{aligned}$$

Where  $t_j$  and  $t_i$  now include  $t_j^3$  and  $t_i^3$  in order to convert market prices to world prices for computational purposes.

Equation (7) is the very formula we adopted in our calculation of the effective protective rates.

For some industries value added at world prices may be either very small or even negative, that is, the effective rate may be negative when the value added per unit of output at world market prices is negative and thus the formula for the effective protective ratio  $\left(\frac{v^*_j - v_i}{v_j}\right)$  has a negative ratio according to equation (7). This does not make sense given the purpose of a

⑦ Legal rate of commodity taxes equals *ex post*  $\frac{T_{dj}}{X'_j}$ .

⑧ The same result can be obtained by using the equation expressed in value terms. In addition, the same formula is derived by discounting the balance equation ( $X' = V'_j - \sum X'_{ij}$ ) by tariff rates.

theory of a tariff's effective protection. In fact, negative value added at world market prices means that the real protective effect of a tariff is very large for the industry if value added at domestic producers' prices is positive.

To eliminate this defect in  $F_j$ , modification was made in line with the Soligo and Stern formula as an alternative version of effective protection.<sup>⑨</sup>

We define  $U_j$  as

$$U_j = \frac{v_j^* - v_j}{v_j^*} = 1 - \frac{v_j}{v_j^*} \dots\dots\dots(8)$$

or for our purposes

$$= 1 - \frac{\frac{1}{1+t_j} - \sum \frac{a''_{ij}}{1+t_i}}{v''_j - t_{dj}} \dots\dots\dots(9)$$

$$= \frac{F_j}{F_j + 1} \dots\dots\dots(10)$$

a) If  $F_j > 0$ , then  $0 < U_j < 1$

$U_j$  does not exceed unity even though  $F_j$  is very large (upper limit when  $F_j > 0$ ).

b) If  $-1 < F_j < 0$ , then  $U_j < 0$

In this case,  $U_j$  has the same negative sign as  $F_j$  and decreases more rapidly than  $F_j$ .

c) If  $F_j < -1$ , then  $U_j > 1$

The conditions that  $F_j$  should be smaller than minus one ( $F_j < -1$ ) are: i)  $v_j^* > 0$  and  $v_j < 0$ , or ii)  $v_j^* < 0$  and  $v_j > 0$ . However, the latter case is hardly found in the actual world, and not at domestic producer's prices in Korea as there is found no negative value added ratio in the 1963 I-0 table for 270 sectors.

The former case means that the negative value added per unit of output in the absence of tariffs is changed to a positive one due to the structure of tariffs and that it enjoys a large effective protection. It is, therefore, regarded reasonable and useful to adopt the concept  $U_j$  rather than  $F_j$ , in comparing or ranking effective protective rates.

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⑨ S.R. Lewis Jr. and S.E. Guisinger, op. cit.

## II. Rankings and Comparisons

### 1. Rankings

Appraisal of the degree of protection has to be made in light of an overall development strategy. However, assuming that the tariff structure reflects the degree of protection intended by the government, a comparison between tariff rates and the effective protective rates can be one way of appraising the degree of protection. The comparison should be made by comparing the relative heights of tariffs and effective protective rates for each item. The relative heights will show if, for example, an industry that the government intended to protect most, by means of the highest total tariff rate on the good produced by it, is, in fact, protected most in terms of the effective protective rate.

For ease of comparison, we placed both tariff rates and the effective protective rates in order of their heights and plotted them in Figures 1—3. The rankings of the respective sectors obtained through such procedure are presented in Tables III—XII.

### 2. Internal Comparisons

Rankings of duty rates adopted ( $t_i = t_i^1 + t_i^2$ ) for our computation reveal that 32 sectors producing 11.65% of total output were subject to duties higher than 100%. The highest duty rate is 325%. Portions of output of commodities with duty rates in the successive 10% intervals are shown in brackets in Table V. 100 sectors producing about 30% are subject to duties higher than 50%, and about 48% of total output produced by 136 sectors are protected with duties higher than 30%.

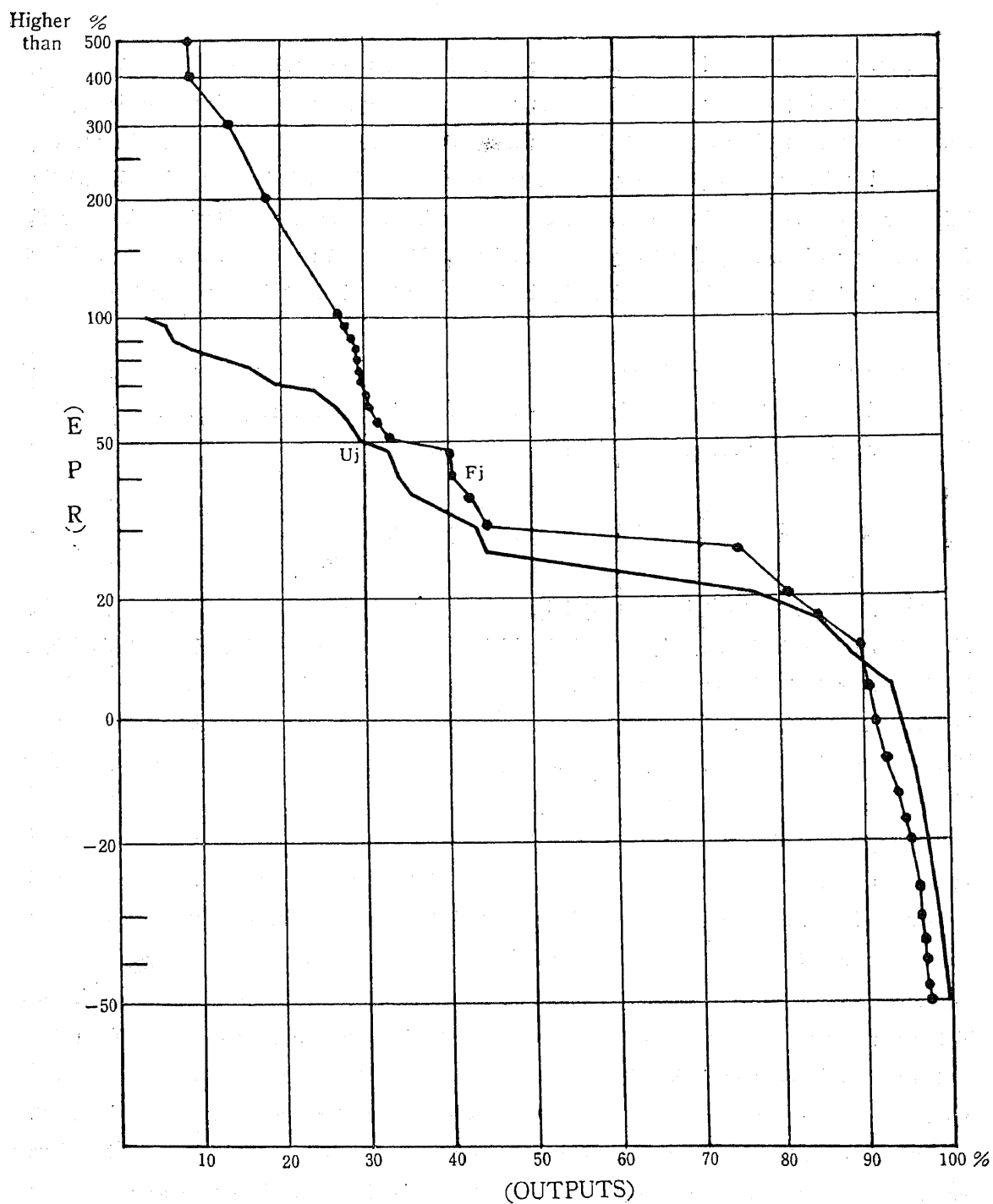
The highest nominal rate of tariff ( $t_i^1$ ) is 250% for cigarettes-and-tobacco and peppermint. Production of these two sectors occupies about 3.9% of total output. There are 7 sectors with tariff rates higher than 100%, and another 7 sectors have rates of exactly 100%. 135 sectors producing nearly 50% of total product have tariff rates higher than 25%.

The effective protective rates ( $U_i$ ) range from 135% to -98%. There are 11 sectors with rates higher than 100% and they produce about 3% of the total output. Sectors with rates from 90% to 100% total 13 and they rank 12th to 24th from the highest. There are 93 sectors with rates higher than 50%, producing about 30% of total product. 132 sectors have rates higher than 25%. 182 out of 218 sectors producing 94% of total output have positive protection. 36 sectors have negative rates of effective protection, and their production is about 6% of total production. Industries operating under severe negative protection less than -10% total 19 sectors.



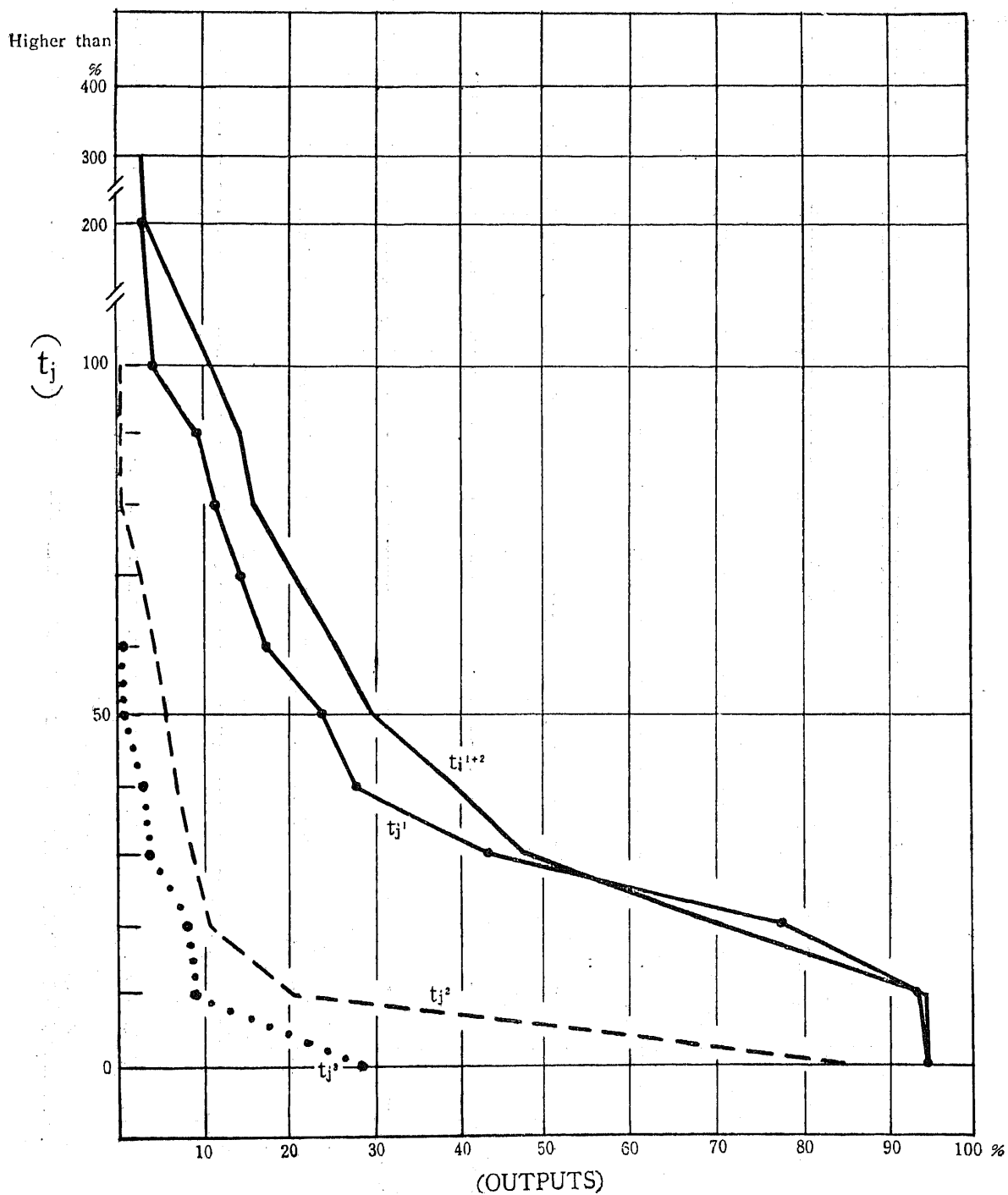
<Figure 1>

Effective Protective Rates for Korean Industries



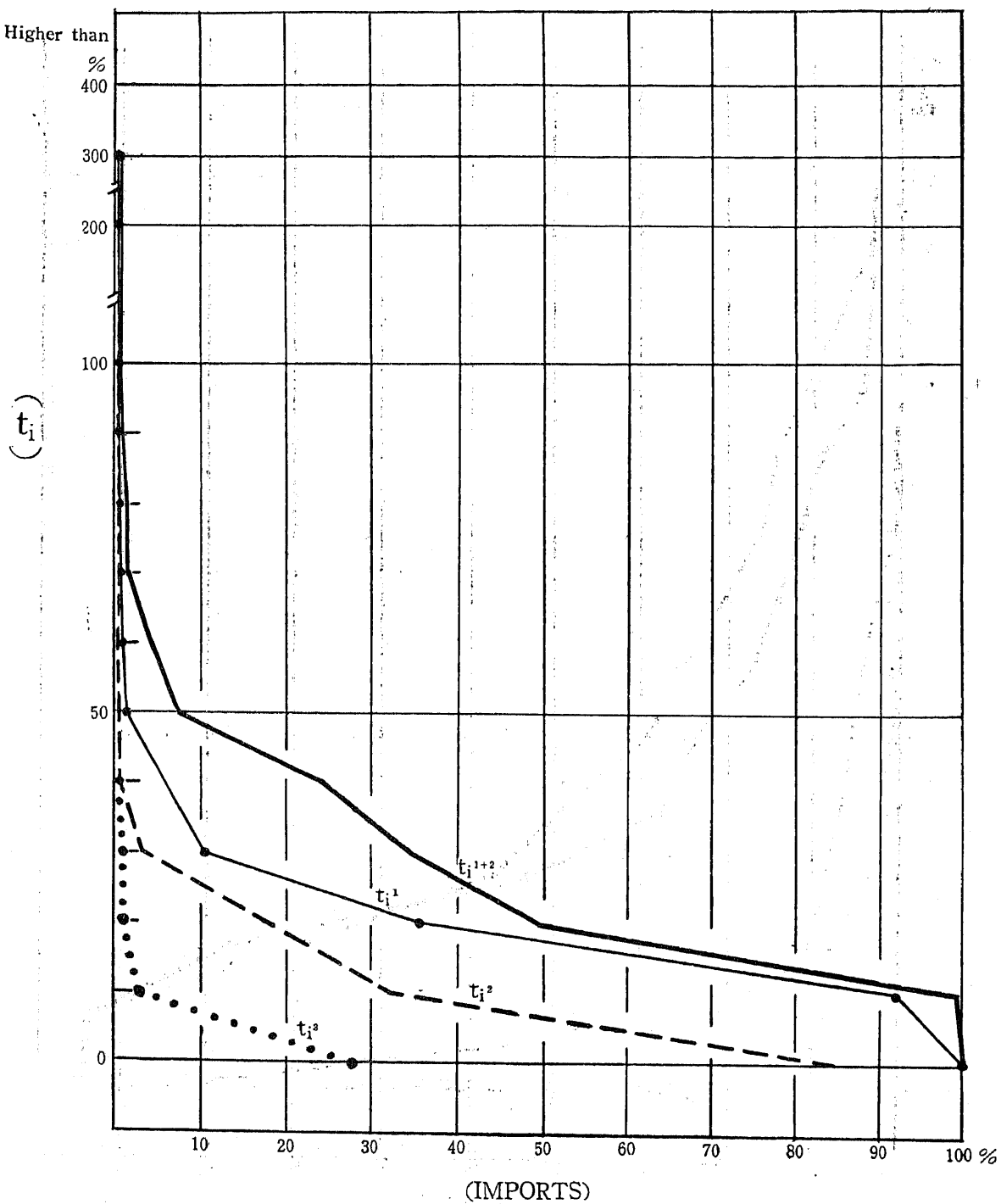
<Figure 2>

Nominal Tariff Rates for Outputs,  $t_j$ , for 1965



⟨Figure 3⟩

Actual Tariff Rates for Inputs,  $t_i$ , for 1965



Cigarettes, ranking 1st in both nominal tariff and total duties, with the respective rates of 250 and 325, stands 31st in the effective protective rates, showing 83.6%. Raw silk ranking 1st with a 135.2% effective protective rate ranks 77th with the rate of 67.3% for total duties, and 54th with a 62% nominal tariff.

For the effective protective rates,  $F_1$ , 82 sectors have rates higher than 100%, producing 17.31% of total output. 47 sectors have rates higher than 200%, and there are 47 sectors with negative rates of effective protection.

The effective rates on finished goods and semifinished manufacturing products are high and the rates on intermediate goods are also high. Products of primary industries, such as farm and mineral products, which are exported but not imported, have extremely low or negative rates of effective protection.

### 3. International Comparisons

In comparing Korea's effective rates of protection with those of advanced countries, Korea exhibits a rate almost twice that of the advanced countries. The thread and yarn industry has a lower rate than textiles in the advanced countries. In Korea the reverse is true. In contrast with high protective rates for ingots and other primary steel forms in advanced countries, Korea has low protective rates on these products.

The pig iron and ferromanganese industry is not protected in advanced countries except for Japan. Korea has been following the advanced countries' form of protection rates in this industry, with a low protective rate of 2.3%.

Korean industries which are operating under high protection, i.e., over 70%, are thread and yarn, clothing, other textile articles, leather products other than shoes, cleaning agents and perfumes, bicycles, motor vehicles, sport goods, toys, etc. as shown in Table I.

Plastic articles, at a rate of 0.9%, are almost unprotected, in contrast with 20.6% for advanced countries. Metal products have low rates of protection in Korea because these goods are mostly imported for construction activities and are in extremely short domestic supply.

It is also worthwhile to compare Korea's rates with those of other developing countries. Industries in Pakistan, for example, are protected more heavily than in Korea on the average. This is seen for industries producing final products, and in the case of industries producing investment goods the point is even more apparent. However, in the case of intermediate goods, Pakistan's average  $U^2$  is lower than ours, though  $U^1$  is somewhat higher.<sup>⑩</sup>

Other conditions for both nations being the same, the comparatively low rate of protection for intermediate goods and the higher rate of protection on final products, means either that the tariff rates for Pakistan's final products are still higher than for Korea's or that Pakistan's tariffs on

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<sup>⑩</sup> See <sup>⑨</sup> above.

Table I. Nominal &amp; Effective Tariff

| Commodity                          | Country<br>Description of Rates | United States |           | United Kingdom |           |
|------------------------------------|---------------------------------|---------------|-----------|----------------|-----------|
|                                    |                                 | Nominal       | Effective | Nominal        | Effective |
| Thread and yarn                    |                                 | 11.7          | 31.8      | 10.5           | 27.9      |
| Textile fabrics                    |                                 | 24.1          | 50.6      | 20.7           | 42.2      |
| Hosiery                            |                                 | 25.6          | 48.7      | 25.4           | 49.7      |
| Clothing                           |                                 | 25.1          | 35.9      | 25.5           | 40.5      |
| Other textile articles             |                                 | 19.0          | 22.7      | 24.5           | 42.4      |
| Shoes                              |                                 | 16.6          | 25.3      | 24.0           | 36.2      |
| Wood products including furniture  |                                 | 12.8          | 26.4      | 14.8           | 25.5      |
| Paper & paper products             |                                 | 3.1           | 0.7       | 6.6            | 8.1       |
| Printed matter                     |                                 | 2.5           | 2.2       | 2.7            | 0.2       |
| Leather                            |                                 | 9.6           | 25.7      | 14.9           | 34.3      |
| Leather goods other than shoes     |                                 | 15.5          | 24.5      | 18.7           | 26.4      |
| Rubber goods                       |                                 | 9.3           | 16.1      | 20.2           | 43.9      |
| Plastic articles                   |                                 | 21.0          | 27.0      | 17.9           | 30.1      |
| Synthetic materials                |                                 | 18.6          | 33.5      | 12.7           | 17.1      |
| Other chemical materials           |                                 | 12.3          | 26.6      | 19.4           | 39.2      |
| Cleaning agents & perfumes         |                                 | 11.2          | 18.8      | 11.1           | 11.2      |
| Miscellaneous chemical products    |                                 | 12.6          | 15.6      | 15.4           | 16.7      |
| Non-metallic mineral products      |                                 | 18.2          | 30.4      | 13.6           | 20.9      |
| Glass & glass products             |                                 | 18.8          | 29.3      | 18.5           | 26.2      |
| Pig iron & ferromanganese          |                                 | 1.8           | 9.3       | 3.3            | 17.9      |
| Ingots & other primary steel forms |                                 | 10.6          | 106.7     | 11.1           | 98.9      |
| Rolling-mill products              |                                 | 7.1           | -2.2      | 9.5            | 7.4       |
| Other steel products               |                                 | 5.1           | 0.5       | 17.0           | 46.8      |
| Non-ferrous metals                 |                                 | 5.0           | 10.6      | 6.6            | 19.4      |
| Metal castings                     |                                 | 6.6           | 10.0      | 16.0           | 26.9      |
| Metal manufactures                 |                                 | 14.4          | 28.5      | 19.0           | 35.9      |
| Agricultural machinery             |                                 | 0.4           | -6.9      | 15.4           | 21.3      |
| Non-electrical machinery           |                                 | 11.0          | 16.1      | 16.1           | 21.2      |
| Electrical machinery               |                                 | 12.2          | 18.1      | 19.7           | 30.0      |
| Ships                              |                                 | 5.5           | 2.1       | 2.9            | -10.2     |
| Railway vehicles                   |                                 | 7.0           | 7.3       | 21.1           | 33.3      |
| Automobiles                        |                                 | 6.8           | 5.1       | 23.1           | 41.4      |
| Bicycles and motorcycles           |                                 | 14.4          | 26.1      | 22.4           | 39.2      |
| Airplanes                          |                                 | 9.2           | 8.8       | 15.6           | 16.7      |
| Precision instruments              |                                 | 21.4          | 32.2      | 25.7           | 44.2      |
| Sports goods, toys, jewelry, etc.  |                                 | 25.0          | 41.8      | 23.3           | 35.6      |

Source: Bela Balassa. op. cit.

1) 1965

# Rates for Industries of Selected Nations, 1962

| Common Market |           | Sweden  |           | Japan   |           | Korea <sup>1)</sup> |           |
|---------------|-----------|---------|-----------|---------|-----------|---------------------|-----------|
| Nominal       | Effective | Nominal | Effective | Nominal | Effective | Nominal             | Effective |
| 2.9           | 3.6       | 2.2     | 4.3       | 2.7     | 1.4       | 60.7                | 74.3      |
| 17.6          | 44.4      | 12.7    | 33.4      | 19.7    | 48.8      | 77.4                | 61.0      |
| 18.6          | 41.3      | 17.6    | 42.4      | 26.0    | 60.8      | 33.2                | 32.5      |
| 18.5          | 25.1      | 14.0    | 21.1      | 25.2    | 42.4      | 110.1               | 74.0      |
| 22.0          | 38.8      | 13.0    | 21.2      | 14.8    | 13.0      | 85.0                | 75.2      |
| 19.9          | 33.0      | 14.0    | 22.8      | 29.5    | 45.1      | 100.6               | 65.7      |
| 15.1          | 28.6      | 6.8     | 14.5      | 19.5    | 33.9      | 55.6                | 25.6      |
| 10.3          | 13.3      | 2.0     | -0.7      | 10.5    | 12.9      | 68.5                | 65.9      |
| 3.3           | -0.7      | 0.7     | 0.0       | 1.6     | -4.2      | 74.9                | 58.2      |
| 7.3           | 18.3      | 7.0     | 21.7      | 19.9    | 59.0      | 72.4                | 61.1      |
| 14.7          | 24.3      | 12.2    | 20.7      | 23.6    | 33.6      | 100.0               | 92.6      |
| 15.1          | 33.6      | 10.8    | 26.1      | 12.9    | 23.6      | 64.6                | 46.6      |
| 20.6          | 30.0      | 15.0    | 25.0      | 24.9    | 35.5      | 32.5                | 0.9       |
| 12.0          | 17.6      | 7.2     | 12.9      | 19.1    | 32.1      | —                   | —         |
| 11.3          | 20.5      | 4.5     | 9.7       | 12.2    | 22.6      | 56.6                | 40.3      |
| 13.8          | 26.7      | 10.9    | 27.9      | 26.2    | 61.5      | 106.9               | 74.2      |
| 11.6          | 13.1      | 2.5     | 0.0       | 16.8    | 22.9      | 70.1                | 60.7      |
| 13.3          | 19.8      | 6.0     | 10.0      | 13.5    | 20.8      | 45.5                | 58.6      |
| 14.4          | 20.0      | 13.8    | 22.6      | 19.5    | 27.4      | 50.8                | 35.9      |
| 4.0           | -13.8     | 0.0     | -0.7      | 10.0    | 54.3      | 10.6                | 2.3       |
| 6.4           | 28.9      | 3.8     | 40.0      | 13.0    | 58.9      | 22.5                | 8.9       |
| 7.2           | 10.5      | 5.2     | 13.2      | 15.4    | 29.5      | 24.0                | 13.6      |
| 9.9           | 20.9      | 5.4     | 9.5       | 13.4    | 14.1      | 52.8                | 46.5      |
| 2.4           | 5.0       | 0.4     | 0.6       | 9.3     | 27.5      | 14.9                | 21.5      |
| 12.4          | 21.0      | 8.0     | 34.7      | 20.0    | 32.5      | 17.5                | 7.4       |
| 14.0          | 25.6      | 8.4     | 16.2      | 18.1    | 27.7      | 57.1                | 51.8      |
| 13.4          | 19.6      | 10.0    | 16.0      | 20.0    | 29.2      | 36.8                | 14.5      |
| 10.3          | 12.2      | 8.8     | 11.6      | 16.8    | 21.4      | 25.9                | 19.2      |
| 14.5          | 21.5      | 10.7    | 17.7      | 18.1    | 25.3      | 42.1                | 22.5      |
| 0.4           | -13.2     | 0.9     | -5.8      | 13.1    | 12.1      | 19.7                | 13.1      |
| 11.1          | -0.2      | 8.7     | 13.8      | 15.0    | 18.5      | 51.8                | 50.6      |
| 19.5          | 36.8      | 14.7    | 30.5      | 35.9    | 75.7      | 110.0               | 33.3      |
| 20.9          | 39.7      | 17.1    | 35.8      | 25.0    | 45.0      | 79.7                | 70.1      |
| 10.5          | 10.8      | 3.7     | 3.0       | 15.0    | 15.9      | —                   | —         |
| 13.5          | 24.2      | 6.6     | 14.9      | 23.2    | 38.5      | 69.9                | 44.4      |
| 17.9          | 26.6      | 10.6    | 16.6      | 21.6    | 31.2      | 66.2                | 74.2      |

Table II. Comparison of the Effective Protective Rates  
between KOREA and PAKISTAN

| Consumption goods                        | PAKISTAN       |                | KOREA |
|--|----------------|----------------|-------|
|  | U <sup>1</sup> | U <sup>2</sup> | U     |
| Canning                                  | 265            | 179            | 80    |
| Bakery products                          | 89             | 59             | 108   |
| Sugar                                    | 109            | 80             | -18   |
| Edible oils                              | 100            | 18             | 62    |
| Tea                                      | -60            | -59            | 49    |
| Salt                                     | 40             | 31             | 46    |
| Beverages                                | 90             | 63             | 68    |
| Cigarettes                               | 106            | 81             | 83    |
| Cotton textiles                          | 147            | 122            | 20    |
| Wool textiles                            | 144            | 123            | 53    |
| Silk & art silk textiles                 | 121            | 99             | 63    |
| Knitting                                 | 94             | 75             | 95    |
| Footwear                                 | 76             | 58             | 66    |
| Wearing apparel                          | 161            | 116            | 95    |
| Wood products (non-metallic furnitures.) | 269            | 170            | 21    |
| Printing & publishing                    | -13            | -22            | 53    |
| Leather products                         | 80             | 58             | 93    |
| Soaps, etc.                              | 1              | 1              | 65    |
| Matches                                  | 38             | 27             | 83    |
| Optical goods                            | 67             | 62             | 92    |
| Plastic goods                            | 81             | 71             | 9     |
| Sports goods                             | 67             | 58             | 71    |
| Pens & pencils                           | 39             | 34             | 65    |
| Metal furniture                          | 268            | 139            | 62    |
| Electric appliances                      | 75             | 66             | 65    |
| Motor vehicles                           | 292            | 155            | 86    |
| Cycles                                   | 182            | 106            | 86    |
| Simple Average :                         | 108            | 73             | 67    |
| <u>Intermediate goods</u>                |                |                |       |
| Jute textiles                            | 92             | 76             | 77    |
| Dyeing & finishing                       | 90             | 49             | 63    |
| Thread & thread ball                     | 62             | 30             | 98    |
| Saw milling                              | 157            | 81             | 14    |
| Tanning                                  | 160            | 105            | 61    |
| Rubber products                          | 39             | 22             | 15    |
| Fertilizer                               | 28             | 12             | 8     |
| Paints & varnishes                       | 27             | 17             | 81    |
| Chemicals                                | -10            | 11             | 46    |
| Petroleum products                       | -55            | -49            | 60    |
| Paper products                           | 83             | 48             | 65    |
| Simple Average :                         | 61             | 37             | 54    |
| <u>Investment and Related goods</u>      |                |                |       |
| Non-metallic mineral products.           | 46             | 39             | 34    |
| Cement                                   | 33             | 27             | 8     |
| Basic metals                             | 3              | -1             | 7     |
| Metal products                           | 247            | 76             | 21    |
| Non-electrical machines                  | 14             | 9              | 23    |
| Sewing machines                          | 120            | 93             | 58    |
| Electric machines & equipment            | 20             | 15             | 17    |
| Other transport equipment                | 26             | 8              | 54    |
| Simple Average :                         | 64             | 33             | 28    |
| Average of all industries :              | 89             | 58             | 57    |

Source : Pakistan : S. R. Lewis Jr. and S. E. Guisinger, op. cit.  
Korea : 1965

intermediate goods are comparatively lower.

However, without knowing more about specific conditions in Pakistan, we can not appraise the height of the effective protective rate for individual items.

There are only three items in common in the ten highest rankings: Cycles, motor vehicles and wearing apparel. The effective protective rate on motor vehicles in Korea is 7th from the top, cycles 8th and wearing apparel 4th, while those of Pakistan's U<sup>2</sup> are ranked 3rd, 8th and 7th and U<sup>1</sup> 1st, 6th and 7th respectively. Bakery products ranking first in Korea rank 22nd in Pakistan's U<sup>2</sup> (21st in U<sup>1</sup>). Canning, top ranking in Pakistan's U<sup>2</sup> (4th in U<sup>1</sup>), ranks 12th in Korea. There are also wide differences in the rates associated with these items.

However, for items which are conspicuous objects for tariffs such as cigarettes and beverages, rates in Korea and Pakistan's U<sup>2</sup> are on similar levels, respectively 83% and 81% for cigarettes, 68% and 63% for beverages.

Household items seem to be protected heavily in Pakistan. Pakistan's U<sup>2</sup> for wood-made furnitures is 170% (269% in U<sup>1</sup>) and for metal furniture 139% (268% in U<sup>1</sup>), while the rates for the two items in Korea are 21% and 62%, respectively.

There are several items with negative rates of effective protection in Pakistan: Printing, petroleum products and tea for both U<sup>1</sup> and U<sup>2</sup>, and base metals in U<sup>2</sup> and chemicals in U<sup>1</sup>. In Korea the item with a negative rate in the compared items is only sugar. In the case of tea, and probably base metals, the negative rate in Pakistan seems justifiable because of the nature of these industries, which are exporters or assemblers in that country. For other items with negative rates in Pakistan, reasons for higher tariffs on inputs and/or lower tariffs on outputs will have yet to be studied.

The range of the degree of protection for Korean industries is narrower than that for Pakistan. From the 18th ranking upward in case of Korea versus Pakistan's U<sup>2</sup>, or the 30th ranking upward in case of Korea versus Pakistan's U<sup>1</sup>, Pakistan's industries are more heavily protected. Downward from these rankings, however, Korean industries are more heavily protected. Pakistan U<sup>1</sup> ranges from the highest rate of 292% (for motor vehicles) to the lowest of -60% (for tea), and U<sup>2</sup> from 179% (for canning) to -59% (for tea), while the effective protective rates in Korea range from 108% (for bakery products) to -18% (for sugar).



### III. Problems and Biases

The method used in Parts I and II raises several questions; most of which can be dealt with by using alternative calculations or through extensions of the basic study. First, domestic market prices may not be equivalent to c.i.f. import prices plus tariffs and commodity taxes, even after allowing for quality differences. Increases in productivity and competition may result in price decreases below the level of c.i.f. prices plus tariffs and commodity taxes. In this case, domestic competition forces prices down below the possible protective level, and the effective rate of protection possible exceeds that actually needed after allowing for quality differences. The value-added in world prices computed by our method is less, therefore, than value added in actual world prices. By using the difference between c.i.f. prices and ex-factory prices to compute a new  $t_j$ , call it  $t'_j$ , we can compute the effective rate of protection actually needed to maintain domestic value-added per unit. We prefer not to say that the new computation gives the "actual" effective rate of protection since domestic prices could rise to yield our method's computed rate, given the present tariff structure, if it were not for domestic competition and increases in productivity.

It is true, however, that the effective rate of protection is definitely understated to the extent that import restrictions raise the domestic price above the c.i.f. import price plus tariffs and commodity taxes. In this case,  $t'_j$  will exceed  $t_j$  and the effective level of protection needed to maintain  $v'_j$  in the absence of restrictions will be higher than the  $F_j$  computed under our method. Such  $t'_j$ 's and  $t'_i$ 's can be computed as an extension of this study by subtracting the c.i.f. price from the ex-factory price and then dividing by the c.i.f. price. The use of these  $t'_j$ 's and  $t'_i$ 's instead of  $t_j$  and  $t_i$  will give the tariff rates that would maintain present  $V'_j$ 's in the absence of restrictions or any *over-protection*. Such a calculation would be an extension of the present study. This calculation in turn would understate the tariff rates actually needed to the extent that aid-tied goods are important in imports, are overpriced relative to world prices and are used to establish c.i.f. prices. This understatement of the degree of protection needed to maintain  $v'_j$  also would be somewhat increased by allowance for quality differences between world traded and domestic products. So, in a situation such as Korea's with many import restrictions and inflationary pressures, it is most likely that the rates of protection computed as necessary to maintain present value-added levels will exceed those rates calculated by our present method, and there probably will be some change in rankings.

One interesting aspect of the inclusion of special customs duties in our  $t_j$ 's, however, is that this rate offers an approximation of the effect of trade restrictions on domestic prices. Special customs duties of 70% (or sometimes 90%) are levied on the difference between domestic prices and the value of imports (c.i.f.) plus nominal tariffs plus commodity taxes plus normal costs of 5%

and allowable profit of 30% of the c.i.f. price. Thus, as a kind of excess profits tax on imports, their value ( $t_j^2$ ) is determined by the effect of restrictions on domestic prices. This means that though our  $t_j$  are below possible  $t'_j$ , they represent an increase of  $t_j$  in the proper direction to measure the actual degree of protection offered a domestic industry.

A second problem concerns the constancy of our  $a''_{ij}$ 's when tariffs and commodity taxes can change the value of  $a''_{ij}$ 's through substitution effects or rate changes. For instance, a lower tariff on intermediate products (given total tariffs on finished goods) should not change value-added in world prices for finished goods but should raise their value added in domestic prices. This increases the effective rate of protection on these finished goods since we assume that domestic prices are equal to c.i.f. prices plus tariffs and commodity taxes. But such an analysis assumes compensatory adjustments in domestic prices to a lowering of tariffs and therefore in the  $a''_{ij}$ 's. If we plug a lower set of tariffs on intermediate goods into our formula without changing the  $a''_{ij}$ 's, however, we discover that value-added in world prices goes down instead of value added in domestic prices going up. The converse is true for a tariff increase on intermediate goods. This tariff change has a correct directional impact on the effective rate of protection though the new effective rate is overestimated in the case of a rate decrease and underestimated in the case of an increase. A similar phenomena is the fact that a tariff change stimulates a substitution of inputs (i.e. less use of an input if the tariff increases and more use if it decreases), and therefore a change of  $a''_{ij}$ 's. The substitution move is always such as to increase domestic value-added and therefore effective rates of protection.

That is if you change tariffs, people will substitute cheaper goods for more expensive goods thus raising value-added relative to what it would be with no substitution effect and relative to value-added at world prices, which is assumed to remain unchanged. Since we assume no change in factor proportions, using the I-0 table, our estimate understates the real effective rate of protection for changes in tariff rates given substitution effects. This bias will act as an offset to the bias created by a decrease in tariffs on intermediate products but will accentuate the bias of an increase. The policy rub, of course, is due to the fact that though value-added may be raised for the entrepreneur it may be lowered for the economy as a whole, if elasticities of supply and demand are such that the value-added lost through increased imports due to lower tariffs on intermediate goods is not gained through increased production. But we shall return to this discussion later when analyzing cascading tariffs, optimal tariff policy, tariffs and net export earnings etc. This kind of discussion is more relevant to our examination of development strategy and the extension of tariff protection backwards from user industries.

In our study, we have taken the 1963 I-0 table as the basis for computing the  $v''_j$ 's,  $v_j$ 's and  $a''_{ij}$ 's. The 1965 tariff and commodity tax structure, both nominal and actual, was used to determine the  $t_j$ 's and  $t'_j$ 's since these most closely represent the tariff and commodity tax structure that

exists today. One of the conceptual problems which of necessity must be disregarded for computational purposes is what impact changes in tariffs and commodity taxes might have had since 1963 on the  $a''_{ij}$ 's, though we can examine some of the relevant biases. Since 1963 imports have been liberalized and aid-financed imports have become less important, thus entrepreneurs are receiving less protection from these sources. So the amount by which other sources of protection might exceed protection offered by tariffs has been reduced. Since the 1963  $v''_j$ 's and  $a''_{ij}$ 's reflect the restrictions of 1963, whereas the costs of commodities world-wide have not changed that much, we would expect the understatement of actual rates of protection to be less now than previously. By our methods though, this reduced understatement is achieved not by a lowering of value-added at domestic prices with a constant value-added at world prices but by the fact that a discounting of value-added at domestic prices in 1965 by the tariff structure is less of an understatement than it was in 1963. On looking at the problem slightly differently, if we apply 1963  $v''_j$  and  $a''_{ij}$ 's to 1965 tariffs, where other restrictions are more liberalized, the value-added base will be too high compared to the use of 1965  $v''_j$ 's. Therefore, we tend to understate real effective rates of protection in 1965 by using 1963 coefficients. However, using the same nominal rates without special customs duties (as law not passed until after 1963) in 1963 to evaluate the effective rate of protection as of 1963, would be much more of an understatement of the effective rates of protection. Ideally, we should have a complete 1965 I-O table to reflect changes in  $a''_{ij}$ 's, non-tradables, and non-competitive imports due to changes in prices, productivity, substitution effects, and capital investments. Unfortunately, though this would give us more accurate sectoral results, it is not yet possible.

Our tariff rates for 1965 were found first on a BTN basis and were later adjusted to an SITC classification. The nominal tariffs were taken from the published code. Actual tariff rates were found by dividing the amount of tariff collected by the value of imports upon which tariffs were levied. This method yielded the necessary actual tariff component of  $t_i$  even if specific tariffs rather than *ad valorem* tariffs were used. The relationship of the actual tariff levied to the average tariff levied (i.e., if include all imports) depends on the amount of imports exempted and the amount on the free list. Data was also compiled for such tariff-free imports.

As there are no nominal rates for special customs duties, two kinds of actual rates were computed. The first was to divide the total customs duties collected by the value of imports upon which they were levied. (Special customs duties are collected at a rate of 70, or in some cases 90 per cent of the difference between the import price, including tariff, commodity taxes, normal costs and allowable profit, and the domestic market price). All goods subject to tariff are supposed to pay this duty, but in actuality a smaller number than are liable pay. Thus, another (slightly lower) rate was computed by dividing the special customs duties collected by the amount paying tariff. Accordingly, as a byproduct of this study it is possible to compare the rates for both

special customs duties and ordinary tariffs between what should have been collected (nominal and variant 1 of special customs duties) and what was actually collected. Variant 1 is also the relevant rate in approximating the influence of restrictions on prices.

Commodity taxes were handled in a different way, as data on the actual amount collected on imported commodities was not available. In the case of commodity taxes, the nominal rate was used according to prescribed imposition in order to compute the proper component of  $t_i$  and  $t_j$ . To compute the commodity tax component of  $t_i$  or  $t_j$ , the nominal commodity tax rate was applied to the value of imports plus tariff plus 10% of the value of imports plus tariffs (allowable profits) in order to get the amount of commodity taxes that should have been collected on imports. This value was then divided by the value of imports subject to the tax in order to get the necessary component of  $t_i$  or  $t_j$ . Because of the inclusion of the 10% allowable profits, the discounting of the  $v''$ 's to estimated world prices by the thus computed  $t_i$ 's and  $t_j$ 's is not complete. This incomplete discounting imparts an upward bias to the effective level of protection if commodity taxes taken out of output are less than those out of inputs and a downward bias if they are more.

For the purposes of our main calculation of the effective rate of protection, we decided that  $t_j$  for sector  $j$  should equal the nominal tariff plus variant 2 of the special customs duties plus the adjusted commodity tax rate for each commodity produced by sector  $j$  all weighted by the outputs of sector  $j$  in order to find the average  $t_j$ . The nominal tariff was used instead of the actual tariff for each commodity as this is what producer's are most likely to see in setting prices. To the extent that using nominal tariffs overstates the effect of tariffs on domestic prices (including the effect of import leakages which may dampen price increases), they overstate the effective rate of protection. This bias is offset to some degree, however, by the nature of the special customs duties whose computed rate on the basis of collections underestimates its restrictive influence on imports.

The computation of  $t_i$  was handled differently as in this case we were interested in the effects of tariffs on what people paid for material for domestic production. Thus  $t_i$  for sector  $i$  is equal to the actual tariff rate plus variant 2 of the special customs duties plus the adjusted commodity tax rate all weighted by the imports of commodities included in sector  $i$  in order to find the average  $t_i$ .

In the case of  $t_j$  there are few conceptual difficulties with this approach, though one might want to replace nominal with actual nominal tariffs collected. But there are no weighting problems as we are interested in how much the value of production in domestic output exceeds the value of that output at world prices. So output weighting is reasonable. The case of inputs is trickier. Here we are interested in the price effect of tariffs paid on inputs into domestic production (including imports). Thus, actual rates paid are more desirable than nominal. But weighting to find the average tariff level,  $t_i$ , is very difficult. If we weight by the domestic output of

sector  $i$ , then we are excluding the cost influence of imports used in domestic production. Further, to the extent that high tariffs encourage domestic production at high prices, we are overstating the cost effect of tariffs unless the demand for imports is very elastic. On the other hand, weighting by imports, though including imports on the cost side, discounts the restricting impact of high tariffs on the volume of imports and the resulting rise in domestic prices and use of domestic products. Total supply weighting would seem to be the logical solution; unless most domestic production is more for final than for intermediate use. We could also use an unweighted mean, but this dodges the problem and solves little. We decided on import weighting as we felt most imports were used as inputs as compared with output for the same sector  $i$ . We have calculated  $t_i$  by output weighting, however, and can thus determine whether this kind of weighting (or a partial weighting if it is used as an estimate total supply weighting) in fact lowers or increases the effective rate of protection. *A priori*, we would expect that import weighting would increase the rate of protection as the import weighted average tariff levels will be lower than the output weighted for the same sector to the extent that demand for those imports is elastic. Indeed, by comparing the average rates for the different weightings we can get some idea of Korea's demand elasticities for imports of these commodities.

Allocation of commodity taxes on inputs causes some similar problems as commodity taxes collected on imports are not included in  $a''_{ij}$ 's whereas those on domestic production are. Except in the case of non-competitive imports, it is not possible (as just noted) to separate the composition of the  $a''_{ij}$ 's into the amount of a commodity actually supplied to sector  $j$  from sector  $i$  as to imports or domestic production. Only in the case of non-competitive imports, therefore, have we not included commodity taxes as part of  $t_i$  for computation purposes (import weighting obviously right in the case of these commodities). In the case of other  $a''_{ij}$ 's we have included them as part of  $t_i$  on the assumption that domestic supply is also important and domestic market prices include the commodity taxes. To the extent that this procedure results in an over-discounting of the  $a''_{ij}$ 's in cases where commodity taxes are important, we are tending to lower the computed effective rate of protection relative to the real case by making value-added at world prices seem larger than it is.

Our weighting and tariff rate choices both seem to have an upward bias on *a priori* grounds, but it should be remembered that operating at the 317 sector level reduces much of the bias by decreasing the distance between the average  $t_j$ 's and  $t_i$ 's computed and the actual rates on given commodities.

After applying our method to the relevant data, we were able to estimate effective rates of protection for Korea on a 218 sector basis. However, as has been true in similar studies in other countries,  $F_j$  was sometimes negative and for two different reasons. In the first case, the effect of tariffs on costs was such as to make value-added at world prices greater than value-

added at domestic producers' prices.

This is what we might normally call a negative rate of protection. In the other case, however, the efficiency of domestic production is so bad that value-added at world prices is negative, which means that domestic production methods are so wasteful as compared with the rest of the world that the cost of inputs per unit would exceed the value of output per unit at world prices. In this case, therefore, to exist, domestic production must be highly protected, quite the opposite of the previous case. In order to separate these two cases we use an alternative index to measure effective levels of protection. It is

$$U_j = \frac{v_j^* - v_j}{v_j^*} = 1 - \frac{v_j}{v_j^*} = \frac{F_j}{1 + F_j}.$$

What it measures is the percent of domestic value-added accounted for by the tariff. If this value is over 100%, then the negative level of protection,  $F_j$ , is of the latter kind. If it is negative, the negative  $F_j$  is of the former kind. Accordingly, if value-added at world prices is to be negative,  $F_j$  must be less than  $-1$ ; whereas if  $F_j$  is to imply a "truly" negative level of protection it must be greater than  $-1$  but less than 0.

Information Readily Available as a by-Product of the Study:

- 1) Nominal tariff rates by commodity.
- 2) Actual tariff rates by commodity.
- 3) Special customs duties—variants 1 and 2.
- 4) Commodity taxes—nominal rates and adjusted nominal rates.
- 5) Value and kind of commodities free of or exempted from tariff (mostly machinery and raw materials)—for 1965, they exceed in value the amount paying duties.
- 6) Value and kind of imports paying tariffs.
- 7) Value and kind of imports paying special customs duties.
- 8) Effective rates of protection  $F_j$  and  $U_j$  as computed by our method.
- 9)  $t_i$  and  $t_j$  output and imported weighted options. By subtracting output weighted  $\frac{1}{1 + t_j}$  from import weighted  $\frac{1}{1 + t_i}$  for the same sector, one can estimate whether the demand for imports of commodities in that sector are elastic or in-elastic depending on whether the difference was positive or negative.
- 10) Value of  $a'_{ij}$ 's.

What might be done with a computer or additional work:

- 11) Computation of existing effective levels of protection under different options concerning the formulation of  $t_i$ 's (including a supply weighted  $t_i$ ) and  $t_j$ 's; the computation for alternative  $t_i$ 's rather than  $t_j$ 's being the really time consuming job due to the need to multiply each

$\frac{1}{1+t_i}$  by the  $a'_{ij}$ 's associated with each of the 317 sectors.

- 12) Computation of effective rates of protection without special customs duties or commodity taxes or even with the inclusion of an alternative tariff schedule, keeping in mind the biases involved from tariff changes.
- 13) Comparison of c.i.f. and exfactory prices in order to estimate what the effects of restrictions or over-protection are in the Korean economy.
- 14) Use of Balassa's or Basevi's Approach<sup>①</sup> to estimate the effect of tariff protection on the returns to capital and labor as factors of production; e.g. are tariffs contributing to high interest rates and low wage rates as the factor cost structure of Korea?

Summary of Biases in Our Estimates of the Effective Protective Rates Versus the Real Rates:

#### Underestimate

1) Inclusion of non-tradables as part of value-added without deducting those inputs into non-tradables that are imported.

2) Not allowing for substitution effects on  $a''_{ij}$ 's.

3) Restrictions on imports in addition to tariffs.

\*4) Impact of imports tied to Aid if their c.i.f. prices are higher than world prices (\*impact only relevant on estimates using price comparisons).

5) No adjustment in  $a''_{ij}$ 's for increased tariffs on the imports of intermediate products.

6) If commodity taxes that are taken out of output are more than those taken out of imports.

7) If special customs duties' rates understate the effect of the duties on domestic prices.

8) Handling of commodity taxes in discounting of  $a''_{ij}$ 's when not non-competitive imports.

9) Influence of export production using tariff free imports whenever U is negative.

#### Overestimate

1) Exclusion of Business activity taxes from  $t_j$  and  $t_i$ .

2) No adjustment in  $a''_{ij}$ 's for decreased tariffs on the imports of intermediate products.

3) If commodity taxes that are taken out of output are less than those taken out of imports.

4) If nominal tariffs overstate the effect of tariffs on domestic price increases.

5) The non-discounting of non-competitive imports by commodity taxes for commodities that are now competitive.

6) Our weighting and tariff choices on *a priori* grounds (such as weighting  $t_i$ 's by imports).

7) Influence of export production using tariff free imports whenever U is positive.

① Bela Balassa, "Tariff protection in Industrial Countries": An Evaluation, *Journal of political Economy*, Dec. 1965.

G. Basevi, "The United States Tariff Structure," *Review of Economics and Statistics*, August 1966.

## IV. Some Normative Aspects of Tariffs

One of the most important conclusions to be drawn from the previous discussion and analysis is that within any given tariff revenue target, the range of tariff structures and their economic impact is quite large. It should also be noted that despite the many errors, biases, and limitations of this study and of our approach, we have a much better appreciation of the tariff structure and its impact than if only nominal rates on imports had been examined since nominal rates give us little information about the interaction of tariffs and the entire economic structure.

But increasing our understanding of the tariff structure and of its impact upon the economy is not enough. We cannot appraise the tariff structure without some idea of what the tariff is supposed to do (i.e., of what is its place in the overall development strategy). In order to place what the tariff is doing in juxtaposition to what it should be doing, it is suggested that some aspects of tariff protection and future research be explored.

Sectors should be ranked as to their degrees of protection on the basis of alternative hypotheses concerning tariff levels. That is, they should be ranked both as to their effective rates and their nominal rates of protection, given alternative  $t_i$ 's and  $t_j$ 's excluding commodity taxes which offer no protection (See Appendix and Tables III—XII). If alternative effective rates of protection are computed or if estimates of the effect of restrictions and overprotection are made, then they should also be ranked and compared with the other rankings (i.e. rank correlations should be made). As part of this comparison exercise we also shall want to compute tariff means, medians, ranges, and perhaps standard deviations of the various alternative estimations. These figures in turn can be compared with the rates and tariff structures estimated by Lewis for Pakistan, Basevi for the United States, and Balassa for several countries, as already partially done in Part II, with allowances made for differences in procedures and economic structure.

We also should investigate whether the highly protected or least protected industries are of a particular kind such as light or heavy, labor intensive or capital intensive, export or import-substitution oriented, large or small firm dominated, etc.. If for instance heavy industry, capital intensive industry, and big firm industry are heavily protected relative to other types, tariffs are being used to promote industries which do not correspond to Korea's factor supplies and are serving to keep rates of return on capital and interest rates high. Further, such a situation indicates that big firms have more political influence for which the consumer and the small producer industry must ultimately pay in higher prices or less protection.

Also we should be interested in whether, for instance, export industries are heavily protected since then export subsidies represent a compensation for the fact that tariffs have driven up domestic prices. On the other hand, if export sectors have negative rates of protection, the subsidy



becomes an additional incentive as the industry is already being encouraged to export by the greater profitability of exports relative to domestic sales. Such industries operate in what is basically a free trade or world price situation since imports are not subject to duty nor exports to protection. Thus, a negative rate of protection means the domestic market is less profitable to produce for than the export or world market. Export production operating at world prices has an impact on industries'  $U_j$ 's and  $a''_{ij}$ 's and the more important exports are to a sector the greater is the bias introduced. For a pure export industry the effective level of protection that is offered in the domestic market is

$$\frac{1+t_j - \sum(a''_{ij} + a''_{ij}t_i)}{v''_j}$$

since its reported value added is dependent on what it buys and sells at world prices. Using

$$\frac{\frac{v''_j - t_{dj}}{1+t_j} - \sum \frac{a''_{ij}}{1+t_i}}{1+t_j}$$

instead of the above generally will make the level of protection seem greater. If sales were made at possible domestic prices for a positive effective rate of protection, value-added at domestic prices would be larger than the value-added reported. With the same degree of tariff discounting in both cases, the former case will have a smaller percentage drop in the denominator. Discounting to world prices being less, the estimated level of protection is less.

In the case of import-substitution industries we have no such estimation problem, but we are interested in what the degree of protection is and what this protection implies about an industry's ability to become competitive in the near future as well as what it indicates about the inefficiencies and welfare costs of supporting a given industry. Such an analysis is particularly important as a prelude to any sort of comparative advantage or implicit exchange rate study since a study of rates of return, profitability, etc. based upon the distortions of a tariff structure cannot be used to analyze real comparative advantage.

Such an examination in turn raises the whole question of the tariff's effect on net export earnings and value-added (GNP). If the effective rate of protection is negative, it pays both to export and to use large quantities of imported inputs on which duties are not paid. This latter incentive in turn lowers net export earnings and the value-added per unit of exports, though not necessarily total value-added from exports which depends also on the demand and supply elasticities of Korean exports. Thus, a negative rate of protection when combined with Korea's export subsidy program (as mentioned in other papers) would act as both a powerful incentive to export and as a powerful incentive to lower net export earnings per unit through an increased use of imported inputs. Any tariff policy, therefore, which is going to encourage exports through negative effective rates of protection should focus primarily on those products which by their nature have high net earning ratios such as those produced by mining and agriculture. To what extent does the Korean situa-

tion follow this recommendation? A comparison of tariff protection and industries' net earning ratios might be quite revealing as might also a comparison with their percent of total exports. Part I indicated that such sectors as mining did have negative effective protective rates. On the other hand, high rates of domestic protection do not encourage exports at all. If exports then are encouraged by subsidies, subsidies need only cover the difference the value added earned at tariff protected domestic prices and that gained through sales at export prices and purchases at import prices. In any case, the exemption of duties on imports for export will always encourage the use of imported materials over domestic materials when such materials are needed for export production, thus lowering net export earnings. However, this fact should not be taken as an argument for eliminating customs rebates in order to encourage domestic products to be used in export production as this would put exporters at a great competitive disadvantage. Customs rebates for export are essential if tariffs are going to be levied. Indeed, a slight subsidy may still be required to maintain export earnings as tariffs are raised to the extent that this raises prices generally and affects the price level of non-tradable inputs into export activities, thus unconsciously taxing exports and making them less competitive. One possible way to eliminate this stimulus to lower net export earnings is by substituting a commodity tax for the tariff and exempting the commodity tax when the material is used for export, though this strategy eliminates any protection offered to the domestic raw material producer and may even result in a negative rate of protection for him. What is obviously silly, however, is the use of an export subsidy which also encourages the use of imported materials for export. This subsidy only enables foreign suppliers to charge higher price thus worsening the balance of payments deficit already hurt by the exemption of customs duties on imports for export. An elimination of tariffs on imported raw materials would serve to decrease the incentive to use imports over domestic goods. This move, however, increases the effective level of protection offered to final output while eliminating or making negative that offered to raw material output. But not only is the raw material producer now unprotected, he will not even gain from this policy unless he is competitive with imports. Thus, net exports are only increased in this way if domestic materials would be used for exports if higher domestic prices were not attracting them into domestic production. The impact of a tariff reduction differs somewhat as compared with the impact of levying a commodity tax.

In making welfare decisions, contributions to GNP (discounted for those due to tariffs), efficiency, etc. obviously play a role and argue for a further extension of this study at a later date into comparative advantage considerations. We do not want to give inefficient or possibly perennially inefficient industries a large incentive. Contributions to GNP at world prices (indicated both by price comparisons and in our study by  $\frac{1}{1+t_j} - \sum \frac{a''_{ij}}{1+t_i}$ ) and implicit exchange rates are a good starting point as are net export earnings, which hopefully will be forthcoming from work on the 1965 I-0 Table. We do not want to base investment or protection decisions on data that already

reflects extensive tariff support as this would be too much of a self-fulfilling prophecy. In any case, to the extent that we base decisions concerning the social incentives (tariffs, subsidies, etc.) to be offered to private value added on the basis of the benefits provided to social value added (GNP contributions), it is probably a good idea to keep non-tradables as part of value-added in our study rather than as a part of costs (a subject we discussed earlier). Their return to the economy is unaffected by whether or not other goods are imported or exported.

Tariffs will also stimulate increased domestic specialization to the extent that lower value-added ratios result in lower net earnings or to the extent that negative rates of protection apply to an industry's intermediate goods suppliers. This specialization or low value-added contribution in turn may result in lower net export earnings, though this impact is small relative to other influences in this direction and depends on the effect of tariffs on the net import content of the industry's inputs (i.e. on the elasticity of demand for various inputs).

Having to some degree examined those kinds of industries that are being protected and certain questions about them, we should ask what industries we want to protect and how we should protect them. That is, what are our desires for unplanned investment stimuli given five year plan priorities, etc., and what degree of protection is justified and/or required for planned investment. Should we offer protection through relatively low rates on output and very low rates on inputs or very high rates on output with medium rates on inputs? What are possible conflicts of interest between protection desired for final goods and intermediate goods producers? These are important questions of development strategy.

Conventional wisdom states that an optimum tariff policy tries to develop less capital intensive and user industries first. One then works back to producers' goods industries as demand develops for their goods from the user industries. At this point in the analysis, we might well become concerned about import restrictions which indicate that tariffs do not completely reflect actual levels of protection and present policy decisions. This is better indicated by the price comparison approach mentioned earlier and perhaps only by price comparisons which reflect domestic prices above c.i.f. prices plus tariffs and commodity taxes if we are concerned with restrictions rather than with productivity changes and possible over-protection. But we can leave this question for the time being. However, if there is no strong argument for protection, then on the grounds of equity and efficiency, we should have a level tariff which would then offer the same degree of effective protection to all producers, i.e. the case where  $t_j = \bar{t}_j$ . Thus, we would not encourage a misallocation of resources by making one industry more profitable though it was no more efficient. Further, given we have decided to protect an industry, we should try to encourage its development towards international efficiency and should not try to develop an industry where this would be difficult, i.e. where  $U_j$  was high. Thus, nominal rates on final products to be protected should not be set too high as intermediate goods to be protected also affect the cost of unprotected

goods and must be set lower. Since they are lower, effective rates for final goods will be set above their  $t_i$ 's. This is not good planning since although user industries should be developed they must be competitive and efficient relative to other industries. If they are not they should not be developed.

Returning to development planning, we should rank industries according to investment levels or planned output levels (or even according to the per cent of change in investment or output levels) as stated in the Plan or Overall Resource Budget. We then should compare these rankings with the effective degree of protection both needed and given. In turn, any extension of this study to a comparative advantage study would focus on implicit exchange rates and price comparisons in conjunction with tariffs and allocation planning in order to determine actually how efficient are industries receiving priority and / or protection and what their contribution to the economy is going to be. Capital-labor and capital-output ratios should also be computed in order to evaluate the contribution of the tariff structure to factor prices and to the allocation of investment resources. Fictitious efficiency due to the tariff structure can thus be separated from reality. Further, one must note that if these industries are producer industries then their cost increases are spread upward through the economy and affect more industries than does higher protection on final goods. This is part of the rationale which advocates protecting user industries move. Also to the extent that productivity changes and international efficiency came more quickly in the user goods, we should develop user industries first. Increases in productivity pass on as price (or relative price) decreases lower value added ratios and increases the potential effective rate of protection. The government then can raise tariffs on inputs (if it wants to protect the industries producing these inputs) without lowering either the effective rate of protection needed (i.e. reduce only the amount of over-protection) or decreasing the nominal rate of protection offered to the user industry (if the psychological effect of the nominal rate is important). This strategy is the reverse of cascading tariffs where low tariffs are given on imported inputs in order to raise the effective level of protection of a given nominal rate on final output. Therefore, one use of tariffs as part of a development strategy could be to decrease effective levels of protection, as an industry's productivity increases through learning etc., making protection less justified by increasing tariffs on imported inputs without raising the tricky psychological and political problem of lowering nominal tariffs. Abuses of high tariffs on output with lower tariffs on inputs can be avoided, though, by putting an equal tariffs on specific subassemblies. In this way, effective tariff protection is passed on equitably to the second and third generation "infant" industries. Also, to the extent that nominal rates have an important psychological tariff protection illusion, we prefer not to substitute an exchange rate devaluation for a lower nominal tariff rate and an elimination of export subsidies, even though our formula indicates (given non-tradables as part of value-added) that there would be no general change in effective rates of protection.

Such a development tariff strategy does not frustrate the passing on of increases in productivity to export development. It only serves to lower net export earnings as tariff free imported inputs are substituted for the newly protected domestic industries' output. This decrease may not be very large if domestic inputs previously were not much used. It can also be avoided by a uniform tariff on most products. Lower net export earnings per unit are a short-run phenomena if secondary, tertiary, etc. "infant" industries grow up rapidly enough together to provide low cost domestic inputs to substitute for tariff free imported inputs and if the overall tariff level is reduced enough so that the c.i.f. import price on these grown up intermediate industries is not less than the ex-factory price. Thus, in order to increase net export earnings as the development strategy succeeds in the long-run, some lowering of nominal rates is necessary.

Given the above discussion, we are interested in the extent to which the Korean tariff structure reflects such a policy, and if not, to what degree it should. This question provides another reason for including non-tradables with value-added rather than costs as they would artificially cascade tariffs treated as costs rather than as value added as they are not directly subject to price adjustments on the cost side through tariff policy.

A further comparison with Pakistan and other countries of their tariff and development strategies would probably be useful to this study and also in any extensions to comparative advantage inquiries. In such a comparison as well as in any analysis of Korea's existing tariff structure and development strategy, we must emphasize the need for consistency of economic relationships. Any lack thereof will indicate a need for more research and policy changes.

Though not exploring all the welfare aspects of the tariff structure beyond its consistency with development goals, we should still note some of the important welfare considerations and what Korea's tariff structure implies concerning implicit welfare decisions. As already mentioned, given any revenue target, the tariff structure can vary widely. Thus, revenue aspects are a less important consideration in this regard, though some revenue target should be made within which to develop the actual tariff structure on the basis of other goals and the incentives to be given. Before reaching this state, however, it might well be asked whether the same revenue and more appropriate incentives could not be offered by a different set of taxes since as stated before, tariffs are only one policy instrument. We might prefer to rely on commodity taxes, subsidies, devaluation, etc. with their different incentive stimuli.

From an analysis of tax, subsidy, and tariff impacts, one can readily see instruments of economic development strategy generally result in increased domestic prices. Therefore, the sacrifice of consumer welfare due to a transfer of income (forced savings) through price increases is a major welfare consideration in using these instruments. Further, it is obvious that consumers are affected more by a rise in the price of certain industries than others, depending on their consumption habits. The government may want to consider that the consumer pays to benefit certain industries

when granting tax, tariff, and subsidies concessions and may demand higher wages and interest rates.

There are, of course, differences between the short-run static effects of such policies and the long-run dynamic effects; the latter being more relevant to a development strategy. Thus, in Pakistan, for instance, it appears that many infant industries have grown up. The question is how long does it take for an industry to grow up and therefore at what time it should be encouraged. Such an evaluation requires the kind of efficiency and comparative advantage study mentioned earlier. Obviously, if a firm is likely to be highly inefficient now, even large productivity increases will not enable it to grow up. It is better to protect more efficient industries first, waiting until later under more optimal conditions to sacrifice consumer welfare for the development of other industries. Thus, one aspect of further studies might be in recommending which industries offer the best potential for rapid competitive development internationally and how they might best be protected given the economic impact of the instruments available for protection. Caution should be used in granting tariff protection, which we see is not costless to the economy, with proper consideration being given to the short-run and long-run welfare factors. Further, one should note that in a high interest rate economy such as Korea the cost of long-run inefficiencies and protection in the form of foregone production and savings is much larger than might at first be suspected. Also, the effective degree of protection and possible changes in it must be constantly scrutinized, reliance on nominal rates obviously not being sufficient. Sound analysis can do much to overcome the psychological, political, and economic arguments that often plague the policy-maker when trying to determine tax, tariff, and subsidy rates, and in rationally deciding the benefits to be allocated to different industries on the basis of their contributions to economic development. Hopefully, such analysis will also serve to crystalize both existing goals as well as needed changes in the existing economic structure and in present policy instruments. As Korea does not lack opportunities or demand for investment projects, it is highly questionable whether the tariff structure should be twisted to provide them.

In the case of Korea, as already mentioned, such policy knowledge is already implicit in the Five Year Plan and in the Overall Resources Budget. Thus, some recommendations should be made as to how changes in the tariff, tax, and subsidy structure might help these implicit, or explicit, development goals. In addition, some estimate should be made of who is going to bear the cost of these incentives and for how long (consumers, which industries, etc.) as well as estimates of who is presently bearing the burden and what the resulting benefits seem to be. Finally, it must be firmly recognized that subsidies and tariffs are not sources of growth, and to the extent that they frustrate the development of quality and competition rather than encourage it, they are inimical to the development strategy. They are necessary short-run evils due to the divergence between long-run dynamic impacts and short-run effects, but they should not be

considered permanent. Indeed, they must change with the economic changes they are designed to encourage. If they are not changed, they will slow rather than increase long-run growth and development.

## (APPENDIX)

## Outline of Work Procedure

### 1. Computation of Input Coefficients

#### (1) Tabulation of 270 Sector Base I-O Table

1963 is taken as the base year for computing the input coefficients ( $a''_{ij}$ ) of importables by sector, and the original data of 1963 I-O table of the Bank of Korea is utilized, since this is the first data available to show a complete picture of the industrial structure. As for the computation of tariff rates and imports, however, 1965 data is used.

The output sector comprises 270 sectors while the input sector is made up of 270 sectors of domestic products and competitive imports plus 18 sectors of non-competitive imports and primary input sectors. Final demand is not considered for the purposes of this study and so has been deleted.

The following shows the frame of the I-O table on which the computation of input coefficients in this study is based.

|                                |               | output                | (270 sectors) |
|--------------------------------|---------------|-----------------------|---------------|
| input                          |               |                       |               |
| Domestic & competitive imports | (270 sectors) | (Intermediate inputs) |               |
| Non-competitive imports        | (18 sectors)  |                       |               |
| Value added                    |               |                       |               |

In the 1963 I-O table, imports are classified into competitive and non-competitive imports. Competitive imports are included in the same cells with inputs of domestic products, whereas non-competitive imports are separated from the 270 sectors of domestic inputs and recorded in cells comprising 18 sectors. The classification of imports into competitive and non-competitive imports is also based on the situation that prevailed in 1963. As a result of the rapid growth of the Korean economy,



the structure of industry has obviously changed since 1963. For instance, petroleum products which were non-competitive in 1963 became competitive in 1965 with the first oil refinery plant in Korea entering into operation.

Though the original data collected for constructing the I-O table were based on the purchasers' prices of the producers, in the 1963 I-O table there is used producers' prices (including commodity taxes), which are suitable for our computation. The commercial margin and transportation charges were excluded from purchasers' prices at the time of the compilation of the 1963 I-O table. These margins and charges were aggregated in two different input sectors from the purchaser's price of the inputs.

## (2) Code for SITC, BTN and I-O

Data available for imports are classified in SITC while tariffs in BTN classification. In order to bring all these differently classified materials into I-O classification, a code-matching table for three different classifications was necessary.

(i) Competitive imports are grouped into 918 items in 6-digit SITC; (ii) these are reclassified in 9-digit I-O code, regrouped into 184 items in 5-digit I-O code (the code for the 270 sectors). Non-competitive imports are classified into 18 sectors as mentioned earlier.

| I—O<br>Non-competitive<br>imports sector | SITC (2-digit)         |
|--|------------------------|
| 1  | 02, 05, 06, 07         |
| 2  | 23                     |
| 3  | 24                     |
| 4  | 25                     |
| 5  | 26                     |
| 6  | 22, 27, 29, 66         |
| 7  | 32, 33, 34             |
| 8  | 41, 42, 43             |
| 9  | 51, 52, 53, 54, 55, 59 |
| 10                                       | 58                     |
| 11                                       | 62                     |
| 12                                       | 64                     |
| 13                                       | 65                     |
| 14                                       | 67                     |
| 15                                       | 68                     |
| 16                                       | 69                     |
| 17                                       | 71, 72, 73             |
| 18                                       | 81, 86, 89             |

## (3) Classification of Tradable Inputs

The inputs of 184 sectors and 18 non-competitive imports are classified as traded inputs of 1965

imports. The remaining 86 sectors, which had no imports in 1965, had to be classified into two categories, namely tradables and nontradables. According to our decision mentioned earlier, nontradables were excluded from inputs of a sector, and included in value added.

There is a problem whether to treat tradable inputs, which were not imported in 1965, as traded goods with zero tariff rate or to treat them as nontradable goods. We treated 50 of the 86 sectors as nontradables and included them in value added of the respective sectors. The rest of the sectors are treated as tradable inputs with zero tariff, since they can be replaced by imports at any time though they were not imported in the particular year of 1965.

Accordingly, 218 input sectors of agriculture, forestry, fishing, mining and manufacturing, 2 input sectors of scraps and 18 sectors of non-competitive inputs are treated as importable inputs.

#### (4) Breakdown of Inputs

29 input sectors out of the 220, excluding non-tradable sectors (in 5-digit I-O code), aggregated with heterogeneous items which are considered to be important tradables, are broken down further into 108 items, in order to raise the degree of accuracy in weighting the average of the effective protective rate for each sector  $\left( \frac{a''_{ij}}{1+t_i} \right)$ .

This is done by calculating the ratio of the detailed composition of inputs per unit of output, based on the original data used in estimating the input structure of the I-O table, and, thus, the inputs of the 29 sectors are broken down into 9-digit I-O codes.

#### (5) Computation of Input Coefficients

Through this work process, matrix of 317 sectors of importable inputs and 220 sectors of output is computed. The value added per unit of output is therefore computed for 220 sectors.

## 2. Calculation of tariff rates on outputs and on inputs

The conceptual difference between  $t_j$  and  $t_i$  has already been discussed in a previous chapter. Due to this difference they had to be calculated separately.

In particular cases where  $t_j$  and  $t_i$  are computed for a single item, there is no difference between  $t_j$  and  $t_i$ . But this does not happen when a sector of the I-O table aggregates the production of several commodities, as the weight of each commodity within one sector's output varies significantly.

As mentioned earlier, in computing  $t_j$  for a sector composed of plural items of production, tariff rates on each individual item have to be weighted by the value of its respective output. Computation of  $t_i$ , on the other hand, is made by averaging the tariff rates on each item of input from the sector weighted by the respective values of imports. Therefore, we computed  $t_j$  and  $t_i$  separately, and the computations took the following steps.

Protective instruments taken into account in this study are the tariff proper ( $t^1$ ) and special customs duties ( $t^2$ ). Commodity taxes ( $t^3$ ) are included in order to convert market prices to

producers' prices. There are, of course, other protective instruments than these, but available data is insufficient for the purpose of calculating effective protective rates including them, although they are partly accounted for in the level of special customs duties. Therefore we excluded them from our calculation. Since this computation is made in relation to the technical structure ( $a''_{ij}$  and  $v''_{ij}$ ) of industries, aggregated  $t_i$  for input sectors are larger in number than  $t_i$  for output sectors including a number of  $a''_{ij}$ .

Data used for our compiling rates of protection is as follows:

- (a) imports by 6-digit SITC: Research Department, the Bank of Korea;
- (b) tariffs and special customs duties collected and related import statistics: Customs Bureau, the Ministry of Finance;
- (c) table of customs tariffs: Korea Tariff Association.

Imports are reclassified on the basis of duties levied, exempted or duty-free.

For the purpose of calculating each duty rate, about 2,000 detail cards were prepared in order to have one item each by 6-digit SITC on a card. Recorded on these cards are:

- i) code numbers of BTN, SITC and I-O (9-digit);
- ii) total imports (A), imports on which tariffs were levied (B), imports on which special customs duties were levied (C);
- iii) tariffs collected (D), special customs duties collected (E), commodity taxes collected (F);
- iv) nominal tariff rates (G), commodity tax rates according to the table of tax rates (H).

Using these cards calculation of duty rates are made as follows:

(a) Actual tariff rates ( $t^1_i$ ) = tariff collected (in won) ÷ imports on which tariffs were levied (in dollars) x exchange rate =  $\frac{D}{B \times 267.04}$  where the applied exchange rate was the annual average of the selling rates.

Rates thus computed should be the same as the nominal rates (G), but we made these calculations in order to convert all the rates of specific tariffs into *ad valorem* tariff rates.

(b) Actual special customs duty rates ( $t^2_i$ ) = special customs duty collected ÷ imports on which tariffs were levied x exchange rate =  $\frac{E}{B \times 267.04}$  (nominal special customs duty rates have also been calculated, for reference, by  $t^2_i = \frac{E}{C \times 267.04}$ ).

(c) Actual commodity tax rates ( $t^3_i$ ) = commodity tax collected ÷ imports on which tariffs levied x exchange rate =  $\frac{F}{B \times 267.04}$ .

Commodity taxes collected from imports were not available in 6-digit SITC; therefore, they were estimated on the basis of the table of commodity tax rates in the following way:

Private imports x exchange rate = M

$M \times (\text{tariff rate} + 1)(1 + 0.1) = N$

(where 0.1 stands for allowed profit rate)

$N \times \text{commodity tax rate} = \text{commodity tax.}$

After completing foregoing calculations for each detail card, summary cards were prepared for 317 sectors. The summary cards were used for the purpose of weighting each  $t_j$  or  $t_i$  ( $t_j^1$ ,  $t_j^2$  &  $t_j^3$  and  $t_i^1$ ,  $t_i^2$  &  $t_i^3$ ) used in computation for the I-O sectors.

Duty rates weighted by imports are called here "actual duty rates",  $t_i$ , adopted for our computation of the effective protective rates.

As mentioned earlier, nominal rates of tariffs and other duties are used for  $t_j$  and output of each commodity within one sector of I-O structure is chosen as weight of  $t_j$  for a sector.

For the purpose of further exploration of the study beyond this stage of computation, import weighted  $t_j$  and output weighted  $t_i$  have been prepared but not included in this publication.

Commodity tax rates to be deducted from value added are calculated as  $t_{dj} = \frac{t_j^3}{1+t_j^3}$ .  $t^3$  is deducted in arriving at the total tariff rate as opposed to the  $t_i$  and  $t_j$  used in computations of effective protective rates.

### SYMBOLS IN TABLES

$U^1$  : Effective Protective rates on the basis of  
purchasers' prices;

$U^2$  : Effective protective rates on the basis of  
producers' prices;

$F_j$  : See page 8, Formula (7);

$U_j$  : See page 9, Formulas (8)-(10);

$t_j^{1+2}$  :  $t_j^1 + t_j^2$ ;

$t_j^1$  : Nominal rates of tariff on import of products;

$t_j^2$  : Special customs duty rates on import of products;

$t_j^3$  : Commodity tax rates on import of products;

$t_i^{1+2}$  :  $t_i^1 + t_i^2$ ;

$t_i^1$  : Nominal rates of tariff on import of inputs;

$t_i^2$  : Special customs duty rates on import of inputs;

$t_i^3$  : Commodity tax rates on import of inputs;

$v_j''$  : Value added in industry  $j$  per unit of output  
in presence of tariffs and commodity taxes.

Table III. F<sub>j</sub> Rankings

| Rank | I-O Code | Item                             | F <sub>j</sub> (%) | Share of output (%) |
|------|----------|----------------------------------|--------------------|---------------------|
| 1    | 35021    | Household metallic products      | 56,385.7           | (8.58)              |
| 2    | 21909    | Miscellaneous liquors            | 7,722.2            |                     |
| 3    | 23110    | Cotton yarn                      | 4,910.9            |                     |
| 4    | 23910    | Straw seats                      | 4,009.2            |                     |
| 5    | 20600    | Sugar confectioneries            | 3,845.6            |                     |
| 6    | 20920    | Starch                           | 2,849.4            |                     |
| 7    | 24901    | Finished textile products        | 1,662.4            |                     |
| 8    | 01143    | Tobacco                          | 1,652.1            |                     |
| 9    | 31201    | Oils                             | 1,562.5            |                     |
| 10   | 34210    | Copper                           | 1,385.6            |                     |
| 11   | 29200    | Leather products                 | 1,255.2            | (0.86)              |
| 12   | 39211    | Optical instruments              | 1,148.9            |                     |
| 13   | 39122    | Sanitary materials               | 930.4              |                     |
| 14   | 27240    | Notebooks & paper for office use | 864.8              |                     |
| 15   | 20710    | Soy sauce & bean paste           | 717.2              |                     |
| 16   | 23130    | Woolen & worsted yarn            | 671.7              |                     |
| 17   | 38300    | Motor vehicles                   | 638.1              |                     |
| 18   | 38510    | Bicycles & push carts            | 618.7              |                     |
| 19   | 20910    | Noodles & vermicelli             | 595.4              |                     |
| 20   | 31113    | Hydrochloric acid                | 508.7              |                     |
| 21   | 22000    | Cigarettes                       | 501.5              |                     |
| 22   | 31925    | Matches                          | 490.6              | (3.46)              |
| 23   | 31992    | Toilet articles                  | 489.5              |                     |
| 24   | 20221    | Canned seafood                   | 482.8              |                     |
| 25   | 21200    | Beer                             | 450.9              |                     |
| 26   | 23240    | Hemp fabrics                     | 443.2              |                     |
| 27   | 31300    | Paint                            | 437.4              | (5.27)              |
| 28   | 30002    | Rubber shoes                     | 364.6              |                     |
| 29   | 23224    | Chemical fibre fabrics           | 361.5              |                     |
| 30   | 39902    | Bristles                         | 354.8              |                     |
| 31   | 39500    | Lacquerware                      | 332.8              |                     |
| 32   | 23141    | Hemp & flax yarn                 | 325.4              | (16.5)              |
| 33   | 20320    | Wheat flour                      | 315.0              |                     |
| 34   | 20211    | Canned fruits & vegetables       | 314.1              |                     |
| 35   | 27230    | Paper cases & bags               | 303.1              |                     |
| 36   | 25300    | Wooden boxes & tubs              | 292.2              |                     |
| 37   | 24300    | Wearing apparel & accessories    | 284.1              | (1.2)               |
| 38   | 27160    | Manila board & plane board       | 282.5              |                     |
| 39   | 31121    | Basic organic chemicals          | 275.8              |                     |
| 40   | 39903    | Toys & sporting goods            | 248.8              |                     |
| 41   | 23222    | Staple fibre fabrics             | 245.5              |                     |
| 42   | 20223    | Preserved seafood                | 241.7              | (1.2)               |
| 43   | 37013    | Electric motors                  | 229.4              |                     |
| 44   | 21600    | Soft drinks                      | 216.0              |                     |
| 45   | 01130    | Fruits                           | 215.1              |                     |
| 46   | 33500    | Cement products                  | 212.0              | (1.2)               |
| 47   | 20999    | Other processed food             | 208.7              |                     |
| 48   | 20101    | Slaughtering                     | 198.5              |                     |
| 49   | 31921    | Soap                             | 191.3              |                     |
| 50   | 24111    | Leather shoes                    | 191.3              |                     |
| 51   | 27210    | Wall floor & window paper        | 188.5              | (1.2)               |
| 52   | 39906    | Stationery                       | 187.2              |                     |
| 53   | 37022    | Household electric appliances    | 183.7              |                     |
| 54   | 31923    | Printing ink                     | 170.2              |                     |
| 55   | 23221    | Silk fabrics                     | 168.3              |                     |
| 56   | 20790    | Miscellaneous seasoning          | 164.6              | (1.2)               |
| 57   | 20996    | Malt                             | 164.2              |                     |
| 58   | 26002    | Metallic furnitures              | 163.0              |                     |
| 59   | 39901    | Umbrellas & parasols             | 161.7              |                     |
| 60   | 20993    | Edible vegetable oils            | 160.0              |                     |
| 61   | 29100    | Leather                          | 157.2              |                     |

| Rank | I-O Code | Item                                 | F <sub>j</sub> (%) | Share of output (%) |
|------|----------|--------------------------------------|--------------------|---------------------|
| 62   | 31929    | Other chemical products              | 154.7              | (8.58)              |
| 63   | 35022    | Tools                                | 150.7              |                     |
| 64   | 32300    | Petroleum products                   | 148.8              |                     |
| 65   | 39212    | Photographic materials               | 146.3              |                     |
| 66   | 39904    | Musical instruments                  | 143.6              |                     |
| 67   | 37035    | Electric copper wire & cable         | 141.2              |                     |
| 68   | 33300    | Pottery                              | 139.0              |                     |
| 69   | 20103    | Dairy products                       | 137.1              |                     |
| 70   | 36061    | Sewing machines                      | 135.6              |                     |
| 71   | 33101    | Structural clay products             | 127.1              |                     |
| 72   | 39701    | Watch                                | 126.4              | (0.86)              |
| 73   | 39112    | Measuring instruments                | 123.2              |                     |
| 74   | 23999    | Miscellaneous textile products       | 123.6              |                     |
| 75   | 20995    | Combined feed                        | 122.5              |                     |
| 76   | 33210    | Plate glass                          | 121.9              |                     |
| 77   | 38901    | Other transport equipment            | 117.3              |                     |
| 78   | 25900    | Other wood products                  | 111.4              |                     |
| 79   | 28009    | Other printing & publishing          | 111.1              |                     |
| 80   | 23230    | Woolen & worsted fabrics             | 110.6              |                     |
| 81   | 37021    | Electric bulbs & fluorescent tubes   | 108.6              |                     |
| 82   | 38201    | Railroad equipment                   | 102.6              | (0.21)              |
| 83   | 27120    | Newsprint wood free & kraft paper    | 98.0               |                     |
| 84   | 20994    | Tea                                  | 96.6               | (0.21)              |
| 85   | 37031    | Electric apparatuses                 | 94.4               |                     |
| 86   | 34250    | Non-ferrous metallic cast products   | 93.8               |                     |
| 87   | 39907    | Accessories                          | 93.5               | (1.59)              |
| 88   | 33930    | Polishing stones & paper             | 87.5               |                     |
| 89   | 36051    | Office machines                      | 87.2               |                     |
| 90   | 35023    | Miscellaneous metal products         | 87.0               |                     |
| 91   | 31910    | Pharmaceutical preparations          | 86.0               |                     |
| 92   | 31191    | Inorganic chemicals                  | 85.9               | (0.01)              |
| 93   | 20992    | Edible salt                          | 84.7               |                     |
| 94   | 25400    | Bamboo & cork products               | 75.3               | (0.03)              |
| 95   | 37012    | Transformers & sockets               | 71.6               | (0.29)              |
| 96   | 31924    | Pesticides                           | 70.4               |                     |
| 97   | 19300    | Talc                                 | 67.9               | (0.46)              |
| 98   | 35012    | Structural metal products            | 67.6               |                     |
| 99   | 31141    | Explosives                           | 63.4               | (0.39)              |
| 100  | 04120    | Laver & oysters                      | 62.6               |                     |
| 101  | 01142    | Perilla frutesens & castor beans     | 61.1               |                     |
| 102  | 31130    | Dyestuffs                            | 61.0               |                     |
| 103  | 01122    | Miscellaneous cereals                | 57.1               | (0.62)              |
| 104  | 01145    | Appreciation plant                   | 56.2               |                     |
| 105  | 34151    | Forged steel                         | 55.7               |                     |
| 106  | 28001    | Newspaper                            | 54.0               | (1.67)              |
| 107  | 34230    | Non-ferrous metallic rolled products | 52.0               |                     |
| 108  | 34131    | Steel pipes                          | 51.4               |                     |
| 109  | 01121    | Pulses                               | 50.8               |                     |
| 110  | 23400    | Knitting mill products               | 49.7               | (7.82)              |
| 111  | 01124    | Vegetables                           | 48.7               |                     |
| 112  | 01123    | Potatoes                             | 48.2               |                     |
| 113  | 01149    | Miscellaneous special crops          | 47.0               |                     |
| 114  | 36034    | Special industry machines            | 46.8               |                     |
| 115  | 23500    | Ropes & fishing nets                 | 46.8               |                     |
| 116  | 33992    | Asbestos products                    | 46.5               | (1.31)              |
| 117  | 33220    | Glass products                       | 39.8               |                     |
| 118  | 38130    | Wooden ship building & repairing     | 38.0               |                     |
| 119  | 02120    | Charcoal & firewood                  | 36.5               |                     |
| 120  | 31112    | Sulfuric acid                        | 35.7               |                     |
| 121  | 15000    | Raw salt                             | 35.7               |                     |

| Rank | I-O Code | Item                                 | F <sub>j</sub> (%) | Share of output (%) |
|------|----------|--------------------------------------|--------------------|---------------------|
| 122  | 31115    | Soda products                        | 33.2               | (2.53)              |
| 123  | 32900    | Coal products                        | 32.0               |                     |
| 124  | 02111    | Forest                               | 32.0               |                     |
| 125  | 01144    | Ginseng & pyrethrum flowers          | 31.3               |                     |
| 126  | 36070    | Machine parts                        | 31.1               |                     |
| 127  | 04110    | Fishery                              | 30.6               |                     |
| 128  | 32210    | Briquets                             | 29.2               | (30.77)             |
| 129  | 01111    | Rice                                 | 28.8               |                     |
| 130  | 34229    | Other non-ferrous metals             | 27.4               |                     |
| 131  | 26001    | Wooden furnitures                    | 26.6               |                     |
| 132  | 01153    | Pigs                                 | 26.4               |                     |
| 133  | 34133    | Cast iron pipe                       | 26.3               |                     |
| 134  | 23210    | Cotton fabrics                       | 24.7               | (5.66)              |
| 135  | 33999    | Other clay & stone products          | 24.6               |                     |
| 136  | 39121    | Medical instrument                   | 24.3               |                     |
| 137  | 01112    | Barley, wheat                        | 23.9               |                     |
| 138  | 36033    | Textile machines                     | 23.5               |                     |
| 139  | 37014    | Other industrial electric machinery. | 22.9               | (4.23)              |
| 140  | 19400    | Fluorspar                            | 21.5               |                     |
| 141  | 23143    | Chemical fibre yarn                  | 21.2               |                     |
| 142  | 01152    | Hens, ducks, turkeys & geese         | 21.2               |                     |
| 143  | 36041    | General purpose industrial machine   | 20.5               |                     |
| 144  | 33991    | Carbon products                      | 19.9               | (4.46)              |
| 145  | 37033    | Machines for post & telegraph        | 19.8               |                     |
| 146  | 01141    | Cotton & hemp                        | 19.8               |                     |
| 147  | 14000    | Sand & stone                         | 19.6               |                     |
| 148  | 19900    | Miscellaneous non-metallic minerals  | 18.3               |                     |
| 149  | 30001    | Rubber products                      | 18.2               | (1.26)              |
| 150  | 31111    | Ammonia                              | 17.7               |                     |
| 151  | 36031    | Farming machines                     | 17.6               |                     |
| 152  | 02112    | Forest products                      | 16.8               |                     |
| 153  | 25100    | Sawmills                             | 16.1               |                     |
| 154  | 34120    | Rolled steel                         | 15.7               |                     |
| 155  | 36011    | Prime mover & boilers                | 14.9               | (1.55)              |
| 156  | 19200    | Kaolin                               | 14.4               |                     |
| 157  | 35011    | Gates                                | 13.9               |                     |
| 158  | 31192    | Oxygen, acetylene & dry ice          | 12.3               |                     |
| 159  | 31114    | Calcium carbide                      | 11.7               |                     |
| 160  | 38120    | Steel ship building & repairing      | 10.3               | (0.12)              |
| 161  | 11100    | Anthracite                           | 10.3               |                     |
| 162  | 01159    | Other livestock, poultry             | 10.1               |                     |
| 163  | 39905    | Synthetic resin products             | 9.3                | (1.26)              |
| 164  | 33400    | Cement                               | 8.5                |                     |
| 165  | 33102    | Fire clay products                   | 8.1                |                     |
| 166  | 31181    | Chemical fertilizer                  | 8.1                |                     |
| 167  | 34111    | Pig iron                             | 7.7                |                     |
| 168  | 19500    | Limestone                            | 7.4                | (1.26)              |
| 169  | 37034    | Watt-meter                           | 6.0                |                     |
| 170  | 38110    | Ship motors                          | 2.5                | (0.12)              |
| 171  | 19100    | Graphite                             | 2.0                |                     |
| 172  | 20310    | Grain milling                        | -0.7               | (1.55)              |
| 173  | 39111    | Scientific instruments               | -0.8               |                     |
| 174  | 12220    | Manganese ore                        | -0.8               |                     |
| 175  | 11200    | Peat & lignite                       | 1.2                |                     |
| 176  | 01151    | Dairy cattle                         | -1.2               |                     |
| 177  | 36022    | Metal processing machines            | -2.5               | (1.55)              |
| 178  | 34112    | Crude steel                          | -2.5               |                     |
| 179  | 12100    | Iron ore                             | -2.9               |                     |
| 180  | 36021    | Working machines                     | -3.0               |                     |
| 181  | 20800    | Ice                                  | -3.0               |                     |
| 182  | 12240    | Copper ore                           | -5.3               | (1.55)              |
| 183  | 34132    | Cast steel                           | -5.6               |                     |
| 184  | 31189    | Other fertilizers                    | -6.4               |                     |



| Rank | I-O Code | Item                                | F <sub>j</sub> (%) | Share of output (%) |
|------|----------|-------------------------------------|--------------------|---------------------|
| 185  | 01170    | Cocoons                             | -7.5               | (0.96)              |
| 186  | 23920    | Straw bags & rope                   | -7.8               |                     |
| 187  | 12290    | Miscellaneous metallic ores         | -7.8               |                     |
| 188  | 12230    | Gold & silver ores                  | -8.7               |                     |
| 189  | 31202    | Fats                                | -10.1              | (0.20)              |
| 190  | 12210    | Tungsten ore                        | -10.2              |                     |
| 191  | 12260    | Zinc ore                            | -10.8              |                     |
| 192  | 12250    | Lead ore                            | -11.2              |                     |
| 193  | 36032    | Mining & construction machines.     | -12.5              |                     |
| 194  | 37011    | Generators                          | -14.5              |                     |
| 195  | 20500    | Sugars                              | -15.2              | (0.82)              |
| 196  | 38400    | Motor vehicle repairing             | -16.6              |                     |
| 197  | 27170    | Window paper                        | -18.9              |                     |
| 198  | 21300    | Clean & unrefined rice wine         | -22.3              | (1.47)              |
| 199  | 21400    | Sake                                | -24.3              |                     |
| 200  | 20991    | Maltose                             | -24.6              |                     |
| 201  | 23142    | Staple fibre yarn                   | -25.5              | (0.15)              |
| 202  | 23991    | Cotton                              | -25.6              |                     |
| 203  | 13000    | Rare element ores                   | -28.7              |                     |
| 204  | 34160    | Galvanized steel pipe               | -30.1              | (0.41)              |
| 205  | 27180    | Asphalt roofing & waterproof paper  | -41.4              | (0.05)              |
| 206  | 20940    | Bean sprouts                        | -47.8              | (0.37)              |
| 207  | 20930    | Bean curd                           | -49.5              |                     |
| 208  | 23120    | Raw silk                            | -383.7             | (2.98)              |
| 209  | 20102    | Canned & processed meat             | -510.1             |                     |
| 210  | 20222    | Seafood                             | -737.7             |                     |
| 211  | 21901    | Fruit wine                          | -888.4             |                     |
| 212  | 25200    | Plywood                             | -1,033.2           |                     |
| 213  | 21101    | Alcohol                             | -1,069.3           |                     |
| 214  | 20400    | Bread & confectioneries             | -1,317.4           |                     |
| 215  | 21103    | Distilled spirits                   | -1,406.5           |                     |
| 216  | 39909    | Miscellaneous manufacturing         | -2,517.6           |                     |
| 217  | 39300    | Precious metals & jewels            | -3,292.9           |                     |
| 218  | 20219    | Other processed fruits & vegetables | -5,375.0           |                     |

Table IV. U<sub>j</sub> Rankings

| Rank | I-O Code | Item                                | U <sub>j</sub> (%) | Share of output (%) |
|------|----------|-------------------------------------|--------------------|---------------------|
| 1    | 23120    | Raw silk                            | 135.2              | (2.98)              |
| 2    | 20102    | Canned & processed meat             | 124.4              |                     |
| 3    | 20222    | Sea food                            | 115.7              |                     |
| 4    | 21901    | Fruit wine                          | 112.7              |                     |
| 5    | 25200    | Plywood                             | 110.7              |                     |
| 6    | 21101    | Alcohol                             | 110.3              |                     |
| 7    | 20400    | Bread & confectioneries             | 108.2              |                     |
| 8    | 21103    | Distilled spirits                   | 107.7              |                     |
| 9    | 39909    | Miscellaneous manufacturing         | 104.1              |                     |
| 10   | 39300    | Precious metals & jewels            | 103.1              |                     |
| 11   | 20219    | Other processed fruits & vegetables | 101.9              |                     |
| 12   | 35021    | Household metallic products         | 99.8               | (2.97)              |
| 13   | 21909    | Miscellaneous liquors               | 98.7               |                     |
| 14   | 23110    | Cotton yarn                         | 98.0               |                     |
| 15   | 23910    | Straw seats                         | 97.6               |                     |
| 16   | 20600    | Sugar confectioneries               | 97.5               |                     |
| 17   | 20920    | Starch                              | 96.6               |                     |
| 18   | 24901    | Finished textile products           | 95.2               |                     |

| Rank | I-O Code | Item                            | U <sub>j</sub> (%) | Share of output (%) |
|------|----------|---------------------------------|--------------------|---------------------|
| 19   | 01143    | Tobacco & peppermint            | 94.3               | (0.95)              |
| 20   | 31201    | Oils                            | 94.0               |                     |
| 21   | 34210    | Copper                          | 93.3               |                     |
| 22   | 29200    | Leather products                | 92.6               |                     |
| 23   | 39211    | Optical instrument              | 92.0               |                     |
| 24   | 39122    | Sanitary materials              | 90.3               |                     |
| 25   | 27240    | Notebook & paper for office use | 89.6               | (2.32)              |
| 26   | 20710    | Soy sauce & bean paste          | 87.8               |                     |
| 27   | 23130    | Woolen & worsted yarn           |                    |                     |
| 28   | 38300    | Motor vehicles                  | 86.5               |                     |
| 29   | 38510    | Bicycle & rear-car              | 86.1               |                     |
| 30   | 20910    | Noodle & vermicelli             | 85.6               |                     |
| 31   | 31113    | Hydrochloric acid               | 83.6               | (3.20)              |
| 32   | 22000    | Cigarette                       | 83.4               |                     |
| 33   | 31925    | Matches                         | 83.1               |                     |
| 34   | 31992    | Toilet articles                 | 82.8               |                     |
| 35   | 20221    | Canned sea food                 | 82.8               |                     |
| 36   | 21200    | Beer                            | 81.8               |                     |
| 37   | 23240    | Hemp fabrics                    | 81.6               |                     |
| 38   | 31300    | Paint                           | 81.4               |                     |
| 39   | 30002    | Rubber shoes                    | 78.5               | (3.46)              |
| 40   | 23224    | Chemical fibre fabrics          | 78.3               |                     |
| 41   | 39902    | Bristles                        | 78.0               |                     |
| 42   | 39500    | Lacquerware                     | 76.9               |                     |
| 43   | 23141    | Hemp & flax yarn                | 76.5               |                     |
| 44   | 20320    | Wheat flour                     | 75.9               |                     |
| 45   | 20211    | Canned fruits & vegetables      | 75.9               |                     |
| 46   | 27230    | Paper case & bag                | 75.2               |                     |
| 47   | 25300    | Wood boxes & tubs               | 74.5               | (3.81)              |
| 48   | 24300    | Wearing apparels & accessories  | 74.0               |                     |
| 49   | 27160    | Manila board & plane board      | 73.9               |                     |
| 50   | 31121    | Basic organic chemicals         | 73.4               |                     |
| 51   | 39903    | Toys & sporting goods           | 71.3               |                     |
| 52   | 23222    | Staple fibre fabrics            | 71.1               |                     |
| 53   | 20223    | Preserved sea food              | 70.7               |                     |
| 54   | 37013    | Electric motor                  | 69.6               | (4.79)              |
| 55   | 21600    | Soft drinks                     | 68.4               |                     |
| 56   | 01130    | Fruits                          | 68.3               |                     |
| 57   | 33500    | Cement products                 | 67.9               |                     |
| 58   | 20999    | Other processed food            | 67.6               |                     |
| 59   | 20101    | Slaughtering                    | 66.5               |                     |
| 60   | 31921    | Soaps                           | 65.7               |                     |
| 61   | 24111    | Leather shoes                   | 65.7               |                     |
| 62   | 27210    | Wall floor & window paper       | 65.3               |                     |
| 63   | 39906    | Stationery                      | 65.2               |                     |
| 64   | 37022    | Household electric appliance    | 64.8               | (2.02)              |
| 65   | 31923    | Printing ink                    | 63.0               |                     |
| 66   | 23221    | Silk fabrics                    | 62.7               |                     |
| 67   | 20790    | Miscellaneous seasoning         | 62.2               |                     |
| 68   | 20996    | Malt                            | 62.1               |                     |
| 69   | 26002    | Metallic furnitures             | 62.0               |                     |
| 70   | 39901    | Umbrella & parasol              | 61.8               |                     |
| 71   | 20993    | Edible vegetable oils           | 61.5               |                     |
| 72   | 29100    | Leather                         | 61.1               |                     |
| 73   | 31929    | Other chemical products         | 60.7               |                     |
| 74   | 35022    | Tools                           | 60.1               |                     |
| 75   | 32300    | Petroleum products              | 59.8               | (1.23)              |
| 76   | 39212    | Photographic materials          | 59.4               |                     |
| 77   | 39904    | Musical instruments             | 58.9               |                     |
| 78   | 37035    | Electric copper wire & cable    | 58.5               |                     |
| 79   | 33300    | Pottery                         | 58.2               |                     |
| 80   | 20103    | Dairy products                  | 57.8               |                     |
| 81   | 36061    | Sewing machine                  | 57.6               |                     |

| Rank | I-O Code | Item                                 | U <sub>i</sub> (%) | Share of output (%) |
|------|----------|--------------------------------------|--------------------|---------------------|
| 82   | 33101    | Structural clay products             | 56.0               |                     |
| 83   | 39701    | Watch                                | 55.8               |                     |
| 84   | 39112    | Measuring instrument                 | 55.8               |                     |
| 85   | 23999    | Miscellaneous textile products       | 55.3               |                     |
| 86   | 20995    | Combined feed                        | 55.1               | (1.99)              |
| 87   | 33210    | Plate glasses                        | 54.9               |                     |
| 88   | 38901    | Other transport equipment            | 54.0               |                     |
| 89   | 25900    | Other wood products                  | 52.7               |                     |
| 90   | 28009    | Other printing & publishing          | 52.6               |                     |
| 91   | 23230    | Woolen & worsted fabrics             | 52.5               |                     |
| 92   | 37021    | Electric bulb & fluorescent tube     | 52.1               |                     |
| 93   | 38201    | Railroad equipment                   | 50.6               | (2.67)              |
| 94   | 27120    | Newsprint wood free & kraft paper    | 49.5               |                     |
| 95   | 20994    | Tea                                  | 49.2               |                     |
| 96   | 37031    | Electric apparatus                   | 48.6               |                     |
| 97   | 34250    | Non-ferrous metallic cast products   | 48.4               |                     |
| 98   | 39907    | Accessories                          | 48.3               |                     |
| 99   | 33930    | Polishing stone & paper              | 46.7               |                     |
| 100  | 36051    | Office machines                      | 46.6               | (0.77)              |
| 101  | 35023    | Miscellaneous metal products         | 46.5               |                     |
| 102  | 31910    | Pharmaceutical preparation           | 46.2               |                     |
| 103  | 31191    | Inorganic chemicals                  | 46.2               |                     |
| 104  | 20992    | Edible salt                          | 45.9               |                     |
| 105  | 25400    | Bamboo & cork products               | 43.0               |                     |
| 106  | 37012    | Transformer & socket                 | 41.7               |                     |
| 107  | 31924    | Pesticide                            | 41.3               | (1.39)              |
| 108  | 19300    | Talc                                 | 40.4               |                     |
| 109  | 35012    | Structural metal products            | 40.3               |                     |
| 110  | 31141    | Explosives                           | 38.8               |                     |
| 111  | 04120    | Laver & oyster                       | 38.5               |                     |
| 112  | 01142    | Perilla frutescens & castor bean     | 37.9               |                     |
| 113  | 31130    | Dyestuffs                            | 37.9               | (9.11)              |
| 114  | 01122    | Miscellaneous cereals                | 36.3               |                     |
| 115  | 01145    | Appreciation plant                   | 36.0               |                     |
| 116  | 34151    | Forged steel                         | 35.8               |                     |
| 117  | 28001    | Newspaper                            | 35.1               |                     |
| 118  | 34230    | Non-ferrous metallic rolled products | 34.2               |                     |
| 119  | 34131    | Steel pipes                          | 33.9               | (1.31)              |
| 120  | 01121    | Pulses                               | 33.7               |                     |
| 121  | 23400    | Knitting mill products               | 33.2               |                     |
| 122  | 01124    | Vegetables                           | 32.8               |                     |
| 123  | 01123    | Potatoes                             | 32.5               |                     |
| 124  | 01149    | Miscellaneous special crops          | 32.0               |                     |
| 125  | 36034    | Special industry machines            | 31.9               | (33.30)             |
| 126  | 23500    | Ropes & fishing nets                 | 31.9               |                     |
| 127  | 33992    | Asbestos products                    | 31.7               |                     |
| 128  | 33220    | Glass products                       | 28.5               |                     |
| 129  | 38130    | Wooden ship building & repairing     | 27.5               |                     |
| 130  | 02120    | Charcoal & firewood                  | 26.7               |                     |
| 131  | 31112    | Sulfuric acid                        | 26.3               |                     |
| 132  | 15000    | Raw salt                             | 26.3               |                     |
| 133  | 31115    | Soda products                        | 24.9               |                     |
| 134  | 32900    | Coal products                        | 24.2               |                     |
| 135  | 02111    | Forest                               | 24.2               |                     |
| 136  | 01144    | Ginseng & pyrethrum flower           | 23.8               |                     |
| 137  | 36070    | Machine parts                        | 23.7               | (1.31)              |
| 138  | 04110    | Fishery                              | 23.4               |                     |
| 139  | 32210    | Briquet                              | 22.6               |                     |
| 140  | 01111    | Rice                                 | 22.4               |                     |
| 141  | 34229    | Other non-ferrous metals             | 21.5               |                     |
| 142  | 26001    | Wood-made furnitures                 | 21.0               |                     |
| 143  | 01153    | Pigs                                 | 20.9               |                     |
| 144  | 34133    | Cast iron pipes                      | 20.8               |                     |

| Rank | I-O Code | Item   | U <sub>j</sub> (%) | Share of output (%) |
|------|----------|--|--------------------|---------------------|
| 145  | 23210    | Cotton fabrics                                   | 19.8               | (6.84)              |
| 146  | 33999    | Other clay & stone products                      | 19.7               |                     |
| 147  | 39121    | Medical instrument                               | 19.5               |                     |
| 148  | 01112    | Barley, wheat                                    | 19.3               |                     |
| 149  | 36033    | Textile machines                                 | 19.0               |                     |
| 150  | 37014    | Other industrial electric machinery & equipment  | 18.6               |                     |
| 151  | 19400    | Fluorspar  | 17.7               |                     |
| 152  | 23143    | Chemical fibre yarn                              | 17.5               |                     |
| 153  | 01152    | Hens, duck, turkey & geese                       | 17.5               |                     |
| 154  | 36041    | General purpose industrial machines & equipments | 17.0               |                     |
| 155  | 33991    | Carbon products                                  | 16.6               | (3.34)              |
| 156  | 37033    | Machine for post & telegraph                     | 16.5               |                     |
| 157  | 01141    | Cotton & hemp                                    | 16.5               |                     |
| 158  | 14000    | Sand & stone                                     | 16.4               |                     |
| 159  | 19900    | Miscellaneous non-metallic minerals              | 15.5               |                     |
| 160  | 30001    | Rubber products                                  | 15.4               |                     |
| 161  | 31111    | Ammonia  | 15.0               |                     |
| 162  | 36031    | Farming machines                                 | 14.5               |                     |
| 163  | 02112    | Forest products                                  | 14.4               |                     |
| 164  | 25100    | Sawmills   | 13.9               |                     |
| 165  | 34120    | Rolled steel                                     | 13.6               | (5.44)              |
| 166  | 36011    | Prime mover & boiler                             | 13.0               |                     |
| 167  | 19200    | Kaolin   | 12.6               |                     |
| 168  | 35011    | Gate   | 12.2               |                     |
| 169  | 31192    | Oxygen acetylene & dry ice                       | 11.0               |                     |
| 170  | 31114    | Calcium carbide                                  | 10.5               |                     |
| 171  | 38120    | Steel ship building & repairing                  | 9.3                |                     |
| 172  | 11100    | Anthracite                                       | 9.3                |                     |
| 173  | 01159    | Other livestock poultry                          | 9.2                |                     |
| 174  | 39905    | Synthetic resin products                         | 8.5                |                     |
| 175  | 33400    | Cement   | 7.8                | (0.72)              |
| 176  | 33102    | Fire clay products                               | 7.5                |                     |
| 177  | 31181    | Chemical fertilizer                              | 7.5                |                     |
| 178  | 34111    | Pig iron   | 7.1                |                     |
| 179  | 19500    | Lime stone                                       | 6.9                |                     |
| 180  | 37034    | Wattmeters                                       | 5.7                |                     |
| 181  | 38110    | Ship motors                                      | 2.4                |                     |
| 182  | 19100    | Graphite   | 2.0                |                     |
| 183  | 20310    | Grain milling                                    | -0.7               | (0.83)              |
| 184  | 39111    | Scientific instruments                           | -0.8               |                     |
| 185  | 12220    | Manganese ore                                    | -0.8               |                     |
| 186  | 11200    | Peat & sub-bituminous coal                       | -1.2               |                     |
| 187  | 01151    | Dairy cattles                                    | -1.3               |                     |
| 188  | 36022    | Metal processing machines                        | -2.6               |                     |
| 189  | 34112    | Crude steel                                      | -2.6               |                     |
| 190  | 12100    | Iron ore   | -3.0               |                     |
| 191  | 36021    | Working machines                                 | -3.1               |                     |
| 192  | 20800    | Ice  | -3.1               | (0.96)              |
| 193  | 12240    | Copper ore                                       | -5.6               |                     |
| 194  | 34132    | Cast steel                                       | -5.9               |                     |
| 195  | 31189    | Other fertilizer                                 | -6.8               |                     |
| 196  | 01170    | Cocoons  | -8.1               |                     |
| 197  | 23920    | Straw bags & rope                                | -8.5               |                     |
| 198  | 12290    | Miscellaneous metallic ores                      | -8.5               |                     |
| 199  | 12230    | Gold & silver ores                               | -9.5               |                     |
| 200  | 36032    | Mining & construction machines                   | -11.1              | (0.17)              |
| 201  | 31202    | Fats   | -11.1              |                     |
| 202  | 12210    | Tungsten ore                                     | -11.4              |                     |
| 203  | 12260    | Zinc ore   | -12.1              |                     |
| 204  | 12250    | Lead ore   | -12.6              |                     |

| Rank | I-O Code | Item  | $\frac{t^3}{j}$ | Share of output (%) |
|------|----------|---|-----------------|---------------------|
| 193  | 36041    | General purpose industrial machine & equipment  | —               |                     |
| 194  | 36051    | Office machines                                 | —               |                     |
| 195  | 36070    | Machine parts                                   | —               |                     |
| 196  | 37011    | Generator                                       | —               |                     |
| 197  | 37012    | Transformer & socket                            | —               |                     |
| 198  | 37013    | Electric motor                                  | —               |                     |
| 199  | 37014    | Other industrial electric machinery & equipment | —               |                     |
| 200  | 37031    | Electric apparatus                              | —               |                     |
| 201  | 37033    | Machine for post & telegraph                    | —               |                     |
| 202  | 37034    | Watt-meter                                      | —               |                     |
| 203  | 37035    | Electric cable                                  | —               |                     |
| 204  | 38110    | Ship motor                                      | —               |                     |
| 205  | 38120    | Steel ship building & repairing                 | —               |                     |
| 206  | 38130    | Wooden ship building                            | —               |                     |
| 207  | 38201    | Railroad equipment                              | —               |                     |
| 208  | 38400    | Motor vehicle repairing                         | —               |                     |
| 209  | 38901    | Other transport equipment                       | —               |                     |
| 210  | 39111    | Scientific instrument                           | —               |                     |
| 211  | 39112    | Measuring instrument                            | —               |                     |
| 212  | 39121    | Medical instrument                              | —               |                     |
| 213  | 39211    | Optical instrument                              | —               |                     |
| 214  | 39122    | Sanitary materials                              | —               |                     |
| 215  | 39212    | Photographic materials                          | —               |                     |
| 216  | 39701    | Watch   | —               |                     |
| 217  | 39901    | Umbrella & parasol                              | —               |                     |
| 218  | 39902    | Bristle   | —               |                     |
| 219  | 39905    | Synthetic resin products                        | —               |                     |
| 220  | 39909    | Miscellaneous manufacturing                     | —               |                     |

| Rank | I-O Code | Item                                | U <sub>j</sub> (%) | Share of output (%) |
|------|----------|-------------------------------------|--------------------|---------------------|
| 205  | 37011    | Generators                          | -16.8              | } (0.82)            |
| 206  | 20500    | Sugars                              | -17.9              |                     |
| 207  | 38400    | Motor vehicle repairs               | -19.9              |                     |
| 208  | 27170    | Window paper                        | -23.3              | (0.03)              |
| 209  | 21300    | Clean & unrefined rice wine         | -28.7              | (1.09)              |
| 210  | 21400    | Sake                                | -32.1              | } (1.37)            |
| 211  | 20991    | Maltose                             | -32.6              |                     |
| 212  | 23142    | Staple fibre yarn                   | -34.2              |                     |
| 213  | 23991    | Cotton                              | -38.4              |                     |
| 214  | 13000    | Rare element ores                   | -40.3              |                     |
| 215  | 34160    | Galvanized steel pipe               | -43.1              |                     |
| 216  | 27180    | Asphalt roofing & water-proof paper | -70.6              |                     |
| 217  | 20940    | Bean sprouts                        | -91.6              |                     |
| 218  | 20930    | Bean curd                           | -98.0              |                     |

Table V.  $t_j^{1+2}$  Rankings

| Rank | I-O Code | Item                                | $t_j^{1+2}$ | $t_j^1$ | $t_j^2$ | $t_j^3$ | Share of output (%) |
|------|----------|-------------------------------------|-------------|---------|---------|---------|---------------------|
| 1    | 22000    | Cigarette                           | 325.0       | 250.1   | 74.9    | —       | (2.92)              |
| 2    | 01143    | Tobacco                             | 312.6       | 250.0   | 62.6    | —       |                     |
| 3    | 21200    | Beer                                | 244.0       | 180.0   | 64.0    | 28.1    | (0.34)              |
| 4    | 21909    | Miscellaneous liquors               | 208.3       | 180.0   | 28.3    | 9.7     |                     |
| 5    | 39500    | Lacquer ware                        | 182.4       | 80.0    | 102.4   | 10.0    | (0.96)              |
| 6    | 21103    | Distilled spirits                   | 180.0       | 180.0   | —       | 4.5     |                     |
| 7    | 21901    | Fruit wine                          | 180.0       | 180.0   | —       | 38.2    |                     |
| 8    | 39211    | Optical instrument                  | 161.5       | 65.4    | 96.1    | —       |                     |
| 9    | 31992    | Toilet articles                     | 150.0       | 150.0   | —       | —       | (0.54)              |
| 10   | 21101    | Alcohol                             | 147.0       | 60.0    | 87.0    | 44.5    |                     |
| 11   | 20221    | Canned sea food                     | 125.5       | 100.0   | 25.5    | —       | (0.66)              |
| 12   | 20400    | Bread & confectioneries             | 124.0       | 100.0   | 24.0    | —       |                     |
| 13   | 31925    | Matches                             | 124.0       | 89.0    | 35.0    | —       |                     |
| 14   | 23224    | Chemical fibre fabrics              | 118.4       | 80.0    | 38.4    | 19.5    | (4.38)              |
| 15   | 31113    | Hydrochloric acid                   | 117.0       | 30.0    | 87.0    | 13.9    |                     |
| 16   | 20211    | Canned fruits & vegetables          | 116.0       | 100.0   | 16.0    | —       |                     |
| 17   | 25200    | Plywood                             | 114.6       | 50.4    | 64.2    | 9.6     |                     |
| 18   | 24901    | Finished textile products           | 112.4       | 90.4    | 22.0    | 49.4    |                     |
| 19   | 39903    | Toys & sporting goods               | 112.2       | 94.5    | 17.7    | 22.4    |                     |
| 20   | 23130    | Woolen & worsted yarn               | 111.8       | 70.1    | 41.7    | 70.0    |                     |
| 21   | 20102    | Canned processed meat               | 111.1       | 87.8    | 23.3    | —       |                     |
| 22   | 24300    | Wearing apparel & accessories       | 110.1       | 98.6    | 11.5    | 27.7    |                     |
| 23   | 38300    | Motor vehicles                      | 110.0       | 85.4    | 24.6    | 6.3     | (1.85)              |
| 24   | 20920    | Starch                              | 109.1       | 41.0    | 68.1    | 10.9    |                     |
| 25   | 39909    | Miscellaneous manufacturing         | 107.1       | 96.4    | 0.7     | —       |                     |
| 26   | 27240    | Note book & paper for office use    | 106.0       | 79.2    | 26.8    | 5.6     |                     |
| 27   | 31121    | Basic organic chemicals             | 105.3       | 70.7    | 34.6    | 1.4     |                     |
| 28   | 20222    | Sea food                            | 104.9       | 66.7    | 38.2    | —       |                     |
| 29   | 20910    | Noodle & vermicelli                 | 100.8       | 100.0   | 0.8     | —       |                     |
| 30   | 20600    | Sugar confectioneries               | 100.7       | 99.7    | 1.0     | —       | (2.57)              |
| 31   | 24111    | Leather shoes                       | 100.6       | 100.0   | 0.6     | —       |                     |
| 32   | 38510    | Bicycle & rear-car                  | 100.4       | 95.3    | 5.1     | 21.0    |                     |
| 33   | 29200    | Leather products                    | 100.0       | 100.0   | —       | 3.4     |                     |
| 34   | 30002    | Rubber shoes                        | 100.0       | 100.0   | —       | —       |                     |
| 35   | 20994    | Tea                                 | 99.0        | 80.0    | 19.0    | 16.3    |                     |
| 36   | 39122    | Sanitary materials                  | 98.0        | 80.0    | 18.0    | —       |                     |
| 37   | 20710    | Soy sauce & bean paste              | 97.1        | 80.0    | 17.1    | —       |                     |
| 38   | 35021    | Household metallic products         | 96.9        | 77.8    | 19.1    | 8.7     | (1.91)              |
| 39   | 20219    | Other processed fruits & vegetables | 92.8        | 77.8    | 15.0    | 3.4     |                     |
| 40   | 33210    | Plate glass                         | 92.3        | 59.9    | 32.4    | 9.9     |                     |
| 41   | 23221    | Silk fabrics                        | 91.0        | 50.0    | 41.0    | 11.4    |                     |
| 42   | 39906    | Stationery                          | 90.5        | 72.5    | 18.0    | 3.4     |                     |
| 43   | 20103    | Dairy products                      | 88.2        | 78.1    | 10.1    | 27.4    | (1.91)              |
| 44   | 27230    | Paper case & bag                    | 88.2        | 80.1    | 8.1     | 4.3     |                     |
| 45   | 39212    | Photographic material               | 86.4        | 68.0    | 18.4    | —       |                     |
| 46   | 33101    | Structural clay products            | 85.9        | 73.7    | 12.2    | —       |                     |
| 47   | 39901    | Umbrella & parasol                  | 85.9        | 78.1    | 7.8     | —       |                     |
| 48   | 38201    | Railroad equipments                 | 85.8        | 85.4    | 0.4     | —       | (1.91)              |
| 49   | 31201    | Oils                                | 85.5        | 37.0    | 48.5    | —       |                     |
| 50   | 31923    | Printing ink                        | 85.3        | 60.1    | 25.2    | —       |                     |
| 51   | 31300    | Paint                               | 84.8        | 62.0    | 22.8    | —       |                     |
| 52   | 20223    | Preserved sea food                  | 82.5        | 70.8    | 11.7    | —       |                     |
| 53   | 27210    | Wall, floor & window paper          | 81.9        | 47.9    | 34.0    | 7.1     | (1.91)              |
| 54   | 37013    | Electric motor                      | 80.1        | 34.1    | 46.0    | —       |                     |
| 55   | 23910    | Straw seats                         | 80.0        | 80.0    | —       | —       | (1.91)              |
| 56   | 39701    | Watch                               | 79.4        | 65.5    | 13.9    | —       |                     |
| 57   | 31910    | Pharmaceutical preparation          | 79.0        | 25.0    | 54.0    | 29.5    |                     |

| Rank | I-O Code | Item                              | $t_j^{1+2}$ | $t_j^1$ | $t_j^2$ | $t_j^3$ | Share of output (%) |
|------|----------|-----------------------------------|-------------|---------|---------|---------|---------------------|
| 58   | 28009    | Other printing & publishing       | 78.8        | 69.0    | 9.8     | —       | (4.59)              |
| 59   | 33300    | Pottery                           | 78.7        | 61.8    | 16.9    | 1.1     |                     |
| 60   | 39904    | Musical instruments               | 78.1        | 62.0    | 16.1    | 1.4     |                     |
| 61   | 26002    | Metallic furnitures               | 77.4        | 75.8    | 1.6     | 9.2     |                     |
| 62   | 21600    | Soft drinks                       | 75.1        | 71.2    | 3.9     | 1.5     |                     |
| 63   | 39907    | Accessories                       | 74.7        | 70.0    | 4.7     | 8.0     |                     |
| 64   | 36051    | Office machines                   | 74.5        | 59.5    | 15.0    | —       |                     |
| 65   | 23240    | Hemp fabrics                      | 73.7        | 72.4    | 1.3     | 16.1    |                     |
| 66   | 33500    | Cement products                   | 73.2        | 73.2    | —       | 6.3     |                     |
| 67   | 20999    | Other processed food              | 72.4        | 55.5    | 16.9    | 16.1    |                     |
| 68   | 29100    | Leather                           | 72.4        | 62.1    | 10.3    | 10.0    | (4.81)              |
| 69   | 37021    | Electric bulb & fluorescent tube  | 71.2        | 65.3    | 5.9     | 3.0     |                     |
| 70   | 20790    | Miscellaneous seasoning           | 70.3        | 70.0    | 0.3     | —       |                     |
| 71   | 37022    | Household electric appliance      | 70.3        | 30.0    | 40.3    | 7.5     |                     |
| 72   | 31929    | Other chemical products           | 70.1        | 57.4    | 12.7    | 13.6    |                     |
| 73   | 35022    | Tool                              | 69.8        | 53.3    | 16.5    | —       |                     |
| 74   | 23110    | Cotton yarn                       | 68.8        | 50.1    | 18.7    | 9.9     |                     |
| 75   | 34210    | Copper                            | 68.6        | 28.8    | 39.8    | —       |                     |
| 76   | 37035    | Electric cable                    | 67.5        | 18.5    | 49.0    | —       |                     |
| 77   | 23120    | Raw silk                          | 67.3        | 62.0    | 5.3     | —       |                     |
| 78   | 01130    | Fruits                            | 66.9        | 59.8    | 7.1     | 4.0     | (4.20)              |
| 79   | 33930    | Polishing stone & paper           | 66.3        | 54.1    | 12.2    | —       |                     |
| 80   | 31130    | Dyestuffs                         | 65.0        | 37.0    | 28.0    | 0.9     |                     |
| 81   | 39112    | Measuring instruments             | 64.3        | 56.2    | 8.1     | —       |                     |
| 82   | 20996    | Malt                              | 64.2        | 56.2    | 8.0     | 4.2     |                     |
| 83   | 31921    | Soap                              | 63.9        | 24.0    | 39.9    | 8.6     |                     |
| 84   | 23143    | Chemical fibre yarn               | 62.8        | 49.6    | 13.2    | 20.0    |                     |
| 85   | 23230    | Woolen & worsted fabrics          | 62.8        | 57.2    | 5.6     | 4.1     |                     |
| 86   | 31924    | Pesticide                         | 61.9        | 58.0    | 3.9     | —       |                     |
| 87   | 27160    | Manila board & plane board        | 61.6        | 54.9    | 6.7     | 2.5     |                     |
| 88   | 23141    | Hemp & flax yarn                  | 60.0        | 50.0    | 10.0    | 10.0    | (10.15)             |
| 89   | 23222    | Staple fibre fabrics              | 60.0        | 49.0    | 11.0    | 40.0    |                     |
| 90   | 38901    | Other transport equipment         | 60.0        | 60.0    | —       | —       |                     |
| 91   | 23210    | Cotton fabrics                    | 59.4        | 53.1    | 6.3     | 4.1     |                     |
| 92   | 25300    | Wood box & tub                    | 59.2        | 50.1    | 9.1     | —       |                     |
| 93   | 19300    | Talc                              | 59.0        | 25.0    | 34.0    | —       |                     |
| 94   | 23999    | Miscellaneous textile products    | 57.6        | 49.4    | 8.2     | 41.3    |                     |
| 95   | 37031    | Electric apparatus                | 56.9        | 51.3    | 5.6     | —       |                     |
| 96   | 25900    | Other wood products               | 54.9        | 41.5    | 13.4    | —       |                     |
| 97   | 36061    | Sewing machines                   | 54.8        | 49.9    | 4.9     | 2.4     |                     |
| 98   | 35023    | Miscellaneous metal products      | 52.8        | 47.9    | 4.9     | —       | (4.20)              |
| 99   | 01121    | Pulses                            | 51.0        | 27.3    | 23.7    | —       |                     |
| 100  | 37012    | Transformer & socket              | 50.7        | 27.8    | 22.9    | —       |                     |
| 101  | 23500    | Ropes & fishing nets              | 49.6        | 36.4    | 13.2    | 47.9    |                     |
| 102  | 31191    | Inorganic chemicals               | 48.9        | 21.9    | 27.0    | 8.6     |                     |
| 103  | 25400    | Bamboo & cork products            | 48.7        | 42.9    | 5.8     | —       |                     |
| 104  | 20993    | Edible vegetable oils             | 48.0        | 48.0    | —       | —       |                     |
| 105  | 04120    | Laver & oyster                    | 45.0        | 45.0    | —       | —       |                     |
| 106  | 27120    | Newsprint wood free & kraft paper | 44.2        | 36.6    | 7.6     | 2.3     |                     |
| 107  | 20320    | Wheat flour                       | 43.9        | 37.6    | 6.3     | —       | (10.15)             |
| 108  | 01145    | Appreciation plant                | 43.5        | 40.2    | 3.3     | —       |                     |
| 109  | 01122    | Miscellaneous cereals             | 43.4        | 43.2    | 0.2     | —       |                     |
| 110  | 01124    | Vegetables                        | 43.3        | 38.5    | 4.8     | —       |                     |
| 111  | 26001    | Wood-made furnitures              | 42.3        | 32.5    | 9.8     | 2.1     |                     |
| 112  | 35012    | Structural metal products         | 42.1        | 32.1    | 10.0    | 0.3     |                     |
| 113  | 39902    | Bristle                           | 42.0        | 41.3    | 0.7     | —       |                     |
| 114  | 31202    | Fats                              | 41.7        | 38.5    | 3.2     | —       |                     |
| 115  | 33220    | Glass products                    | 41.2        | 37.9    | 3.3     | 3.2     |                     |
| 116  | 01144    | Ginseng & pyrethrum flower        | 40.4        | 39.7    | 0.7     | —       | (4.20)              |
| 117  | 28001    | Newspaper                         | 40.4        | 39.7    | 0.7     | —       |                     |
| 118  | 01142    | Perilla frutescens & castor beans | 40.0        | 40.0    | —       | —       |                     |
| 119  | 01123    | Potatoes                          | 39.8        | 39.8    | —       | —       |                     |
| 120  | 20995    | Combined food                     | 38.5        | 20.0    | 18.5    | —       |                     |
| 121  | 33992    | Asbestos products                 | 38.4        | 37.2    | 1.2     | —       |                     |
| 122  | 34151    | Forged steel                      | 37.3        | 21.6    | 15.7    | —       |                     |



| Rank | I-O Code | Item  | $t_j^{1+2}$ | $t_j^1$ | $t_j^2$ | $t_j^3$ | Share of output (%) |
|------|----------|---|-------------|---------|---------|---------|---------------------|
| 123  | 31141    | Explosives                                      | 36.9        | 35.6    | 1.3     | 12.0    | (8.09)              |
| 124  | 36031    | Farming machines                                | 36.8        | 35.1    | 1.7     | —       |                     |
| 125  | 04110    | Fishery   | 36.5        | 35.4    | 1.1     | —       |                     |
| 126  | 34131    | Steel pipes                                     | 36.4        | 26.0    | 10.4    | —       |                     |
| 127  | 02120    | Charcoal & firewood                             | 36.0        | 35.7    | 0.3     | —       |                     |
| 128  | 34250    | Non-ferrous metallic cast products              | 35.6        | 34.3    | 1.3     | —       |                     |
| 129  | 31112    | Sulphuric acid                                  | 35.0        | 35.0    | 1.3     | —       |                     |
| 130  | 20101    | Slaughtering                                    | 34.9        | 31.1    | 3.8     | 2.3     |                     |
| 131  | 01149    | Miscellaneous special crops                     | 33.9        | 33.3    | 0.6     | —       |                     |
| 132  | 34230    | Non-ferrous metallic rolled products            | 33.3        | 29.4    | 3.9     | 3.5     |                     |
| 133  | 37014    | Other industrial electric machinery & equipment | 32.5        | 31.3    | 1.2     | —       | (30.44)             |
| 134  | 39905    | Synthetic resin products                        | 32.5        | 32.5    | —       | —       |                     |
| 135  | 36070    | Machine parts                                   | 31.4        | 30.2    | 1.2     | —       |                     |
| 136  | 15000    | Raw salt  | 31.0        | 30.0    | 1.0     | —       |                     |
| 137  | 20992    | Edible salt                                     | 30.0        | 30.0    | —       | —       |                     |
| 138  | 39121    | Medical instrument                              | 29.4        | 24.6    | 4.8     | —       |                     |
| 139  | 36034    | Special-industry machine                        | 29.2        | 27.2    | 2.0     | —       |                     |
| 140  | 30001    | Rubber products                                 | 29.1        | 23.7    | 5.4     | 2.1     |                     |
| 141  | 02111    | Forest  | 29.0        | 10.0    | 19.0    | —       |                     |
| 142  | 01152    | Hen, duck, turkey & geese                       | 28.7        | 27.5    | 1.2     | —       | (15.92)             |
| 143  | 31115    | Soda products                                   | 28.3        | 23.7    | 4.6     | 8.8     |                     |
| 144  | 37033    | Machine for post & telegraph                    | 28.0        | 28.0    | —       | —       |                     |
| 145  | 33999    | Other clay & stone products                     | 27.9        | 27.6    | 0.3     | —       |                     |
| 146  | 32300    | Petroleum products                              | 26.2        | 25.1    | 1.1     | 47.2    |                     |
| 147  | 01111    | Rice  | 25.3        | 24.4    | 0.9     | —       |                     |
| 148  | 19400    | Fluorspar                                       | 25.0        | 25.0    | —       | —       |                     |
| 149  | 33991    | Carbon products                                 | 25.0        | 25.0    | —       | —       |                     |
| 150  | 34133    | Cast iron pipe                                  | 25.0        | 25.0    | —       | —       |                     |
| 151  | 38130    | Wooden ship building                            | 25.0        | 25.0    | —       | —       |                     |
| 152  | 34120    | Rolled steel                                    | 24.0        | 21.1    | 2.9     | —       | (15.92)             |
| 153  | 38120    | Steel ship building                             | 23.2        | 19.2    | 4.0     | —       |                     |
| 154  | 32900    | Coal products                                   | 22.3        | 20.0    | 2.3     | —       |                     |
| 155  | 14000    | Sand & stone                                    | 21.3        | 21.5    | 0.4     | —       |                     |
| 156  | 36033    | Textile machines                                | 21.5        | 21.0    | 0.5     | —       |                     |
| 157  | 19900    | Miscellaneous non-metallic minerals             | 20.6        | 13.7    | 6.9     | —       |                     |
| 158  | 01170    | Cocoon  | 20.0        | 20.0    | —       | —       | (15.92)             |
| 159  | 20500    | Sugars  | 20.0        | 19.8    | 0.2     | 39.8    |                     |
| 160  | 31111    | Ammonia   | 20.0        | 20.0    | —       | —       |                     |
| 161  | 32210    | Briquet   | 20.0        | 20.0    | —       | —       |                     |
| 162  | 39300    | Precious metals & jewels                        | 20.0        | 20.0    | —       | 10.0    |                     |
| 163  | 36011    | Prime mover & boiler                            | 19.9        | 18.3    | 1.6     | —       |                     |
| 164  | 37034    | Watt meter                                      | 19.4        | 15.2    | 4.2     | —       |                     |
| 165  | 01141    | Cotton & hemp                                   | 18.6        | 17.5    | 1.1     | 0.5     |                     |
| 166  | 31192    | Oxygen, acetylene & dry ice                     | 18.5        | 15.4    | 3.1     | 10.0    |                     |
| 167  | 36041    | General purpose industrial machine              | 18.0        | 18.0    | —       | —       |                     |
| 168  | 01112    | Barley & wheat                                  | 17.8        | 17.0    | 0.8     | —       | (15.92)             |
| 169  | 02112    | Forest products                                 | 17.3        | 12.0    | 5.3     | —       |                     |
| 170  | 31181    | Chemical fertilizer                             | 17.1        | 6.3     | 10.8    | —       |                     |
| 171  | 23400    | Knitting mill products                          | 16.7        | 13.8    | 2.9     | 41.2    |                     |
| 172  | 33400    | Cement  | 16.0        | 15.0    | 1.0     | 5.0     |                     |
| 173  | 11100    | Anthracite                                      | 15.0        | 15.0    | —       | —       |                     |
| 174  | 19200    | Kaolin  | 15.0        | 15.0    | —       | —       |                     |
| 175  | 19500    | Lime stone                                      | 15.0        | 15.0    | —       | —       |                     |
| 176  | 31114    | Calcium carbide                                 | 15.0        | 15.0    | —       | —       |                     |
| 177  | 35011    | Gates   | 15.0        | 15.0    | —       | —       |                     |
| 178  | 39111    | Scientific instruments                          | 15.0        | 15.0    | —       | —       | (15.92)             |
| 179  | 34229    | Other non-ferrous metals                        | 14.9        | 14.9    | —       | —       |                     |
| 180  | 01153    | Pig   | 14.5        | 10.1    | 4.4     | —       |                     |
| 181  | 25100    | Saw mills                                       | 14.3        | 10.8    | 3.5     | —       |                     |
| 182  | 33102    | Fire clay products                              | 13.9        | 13.9    | —       | —       |                     |
| 183  | 01159    | Other livestock & poultry                       | 11.5        | 11.2    | 0.3     | —       |                     |
| 184  | 34112    | Crude steel                                     | 10.8        | 10.0    | 0.8     | —       |                     |
| 185  | 38110    | Ship motor                                      | 10.8        | 10.8    | —       | —       |                     |
| 186  | 34111    | Pig iron  | 10.4        | 10.0    | 0.4     | —       |                     |
| 187  | 19100    | Graphite  | 10.2        | 10.2    | —       | —       |                     |

| Rank | I-O Code | Item                           | $t_j^{1+2}$ | $t_j^1$ | $t_j^2$ | $t_j^3$ | Share of output (%) |
|------|----------|--------------------------------|-------------|---------|---------|---------|---------------------|
| 188  | 12240    | Copper ore                     | 10.0        | 10.0    | —       | —       | (0.28)              |
| 189  | 34132    | Cast steel                     | 10.0        | 10.0    | —       | —       |                     |
| 190  | 01151    | Dairy cattle                   | 8.4         | 8.3     | 0.1     | —       |                     |
| 191  | 36021    | Working machines               | 5.3         | 5.3     | —       | —       |                     |
| 192  | 36022    | Metal processing machine       | 5.0         | 5.0     | —       | —       |                     |
| 193  | 36032    | Mining & construction machines | 5.0         | 5.0     | —       | —       |                     |
| 194  | 11200    | Peat & sub-bituminous coal     | —           | —       | —       | —       | (5.39)              |
| 195  | 12100    | Iron ore                       | —           | —       | —       | —       |                     |
| 196  | 12210    | Tungsten ore                   | —           | —       | —       | —       |                     |
| 197  | 12220    | Manganese ore                  | —           | —       | —       | —       |                     |
| 198  | 12230    | Gold & silver ores             | —           | —       | —       | —       |                     |
| 199  | 12250    | Lead ore                       | —           | —       | —       | —       |                     |
| 200  | 12260    | Zinc ore                       | —           | —       | —       | —       |                     |
| 201  | 12290    | Miscellaneous metallic ores    | —           | —       | —       | —       |                     |
| 202  | 13000    | Rare element ores              | —           | —       | —       | —       |                     |
| 203  | 20310    | Grain milling                  | —           | —       | —       | —       |                     |
| 204  | 20800    | Ice                            | —           | —       | —       | —       |                     |
| 205  | 20930    | Bean curd                      | —           | —       | —       | —       |                     |
| 206  | 20940    | Bean sprout                    | —           | —       | —       | —       |                     |
| 207  | 20991    | Maltose                        | —           | —       | —       | —       |                     |
| 208  | 21300    | Clean & unrefined rice wine    | —           | —       | —       | 6.8     |                     |
| 209  | 21400    | Sake                           | —           | —       | —       | 27.8    |                     |
| 210  | 23142    | Staple-fibre yarn              | —           | —       | —       | 10.0    |                     |
| 211  | 23920    | Straw bags & rope              | —           | —       | —       | —       |                     |
| 212  | 23991    | Cotton                         | —           | —       | —       | —       |                     |
| 213  | 27170    | Window paper                   | —           | —       | —       | —       |                     |
| 214  | 27180    | Asphalt roofing & water proof  | —           | —       | —       | —       |                     |
| 215  | 31189    | Other fertilizer               | —           | —       | —       | —       |                     |
| 216  | 34160    | Galvanized steel pipe          | —           | —       | —       | 4.0     |                     |
| 217  | 37011    | Generator                      | —           | —       | —       | —       |                     |
| 218  | 38400    | Motor vehicle repairing        | —           | —       | —       | —       |                     |
| 219  | 88001    | Metal scrap                    | —           | —       | —       | 6.2     |                     |
| 220  | 88002    | Other scrap                    | —           | —       | —       | 5.9     |                     |

Table M.  $t_j^1$  Rankings

| Rank | I-O Code | Item                          | $t_j^1$ | Share of output (%) |
|------|----------|-------------------------------|---------|---------------------|
| 1    | 22000    | Cigarette                     | 250.1   | (4.31)              |
| 2    | 01143    | Tobacco & peppermint          | 250.0   |                     |
| 3    | 21103    | Distilled spirits             | 180.0   |                     |
| 4    | 21200    | Beer                          | 180.0   |                     |
| 5    | 21901    | Fruit wine                    | 180.0   |                     |
| 6    | 21909    | Miscellaneous liquors         | 180.0   | (5.07)              |
| 7    | 31992    | Toilet articles               | 150.0   |                     |
| 8    | 20211    | Canned fruits & vegetables    | 100.0   |                     |
| 9    | 20221    | Canned sea food               | 100.0   |                     |
| 10   | 20400    | Bread & confectioneries       | 100.0   |                     |
| 11   | 20910    | Noodle & vermicelli           | 100.0   | (0.16)              |
| 12   | 24111    | Leather shoes                 | 100.0   |                     |
| 13   | 29200    | Leather products              | 100.0   |                     |
| 14   | 30002    | Rubber shoes                  | 100.0   |                     |
| 15   | 20600    | Sugar confectioneries         | 99.7    |                     |
| 16   | 24300    | Wearing apparel & accessories | 98.6    | (0.16)              |
| 17   | 39909    | Miscellaneous manufacturing   | 96.4    |                     |
| 18   | 38510    | Bicycle & rear-car            | 95.3    | (0.16)              |
| 19   | 39903    | Toys & sporting goods         | 94.5    |                     |
| 20   | 24901    | Finished textile products     | 90.4    |                     |

| Rank | I-O Code | Item                                | $t_j^1$ | Share of output (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 21   | 31925    | Matches                             | 89.0    | (0.39)              |
| 22   | 20102    | Canned, processed meat              | 87.8    |                     |
| 23   | 38300    | Motor vehicles                      | 85.4    |                     |
| 24   | 27230    | Paper case & bag                    | 0.1     | (0.21)              |
| 25   | 20710    | Soy sauce & bean paste              | 80.0    | (1.80)              |
| 26   | 20994    | Tea                                 | 80.0    |                     |
| 27   | 23224    | Chemical fibre fabrics              | 80.0    |                     |
| 28   | 23910    | Straw seats                         | 80.0    |                     |
| 29   | 39122    | Sanitary materials                  | 80.0    |                     |
| 30   | 39500    | Lacquer ware                        | 80.0    |                     |
| 31   | 27240    | Notebook & paper for office use     | 79.2    |                     |
| 32   | 20103    | Dairy products                      | 78.1    |                     |
| 33   | 39901    | Umbrella & parasol                  | 78.1    | (2.44)              |
| 34   | 20219    | Other processed fruits & vegetables | 77.8    |                     |
| 35   | 35021    | Household metallic products         | 77.8    |                     |
| 36   | 26002    | Metallic furnitures                 | 75.8    |                     |
| 37   | 33101    | Structural clay products            | 73.7    |                     |
| 38   | 33500    | Cement products                     | 73.2    |                     |
| 39   | 39906    | Stationery                          | 72.5    |                     |
| 40   | 23240    | Hemp fabrics                        | 72.4    |                     |
| 41   | 21600    | Soft drinks                         | 71.2    | (1.83)              |
| 42   | 20223    | Preserved sea food                  | 70.8    |                     |
| 43   | 31121    | Basic organic chemicals             | 70.7    |                     |
| 44   | 23130    | Woolen & worsted yarn               | 70.1    |                     |
| 45   | 20790    | Miscellaneous seasoning             | 70.0    | (0.92)              |
| 46   | 39907    | Accessories                         | 70.0    |                     |
| 47   | 28009    | Other printing & publishing         | 69.0    |                     |
| 48   | 39212    | Photographic materials              | 68.0    |                     |
| 49   | 20222    | Sea food                            | 66.7    |                     |
| 50   | 39701    | Watch                               | 65.5    | (2.40)              |
| 51   | 39211    | Optical instrument                  | 65.4    |                     |
| 52   | 37021    | Electric bulb & fluorescent tube    | 65.3    |                     |
| 53   | 29100    | Leather                             | 62.1    | (4.92)              |
| 54   | 23120    | Raw silk                            | 62.0    |                     |
| 55   | 31300    | Paint                               | 62.0    |                     |
| 56   | 39904    | Musical instruments                 | 62.0    |                     |
| 57   | 33300    | Pottery                             | 61.8    |                     |
| 58   | 31923    | Printing ink                        | 60.1    | (0.39)              |
| 59   | 21101    | Alcohol                             | 60.0    |                     |
| 60   | 38901    | Other transport equipment           | 60.0    |                     |
| 61   | 33210    | Plate glass                         | 59.9    |                     |
| 62   | 01130    | Fruits                              | 59.8    |                     |
| 63   | 36051    | Office machines                     | 59.5    | (0.92)              |
| 64   | 31924    | Pesticide                           | 58.0    |                     |
| 65   | 31929    | Other chemical products             | 57.4    |                     |
| 66   | 23230    | Woolen & worsted fabrics            | 57.2    |                     |
| 67   | 20996    | Malt                                | 56.2    |                     |
| 68   | 39112    | Measuring instrument                | 56.2    | (2.40)              |
| 69   | 20999    | Other processed food                | 55.5    |                     |
| 70   | 27160    | Manila board & plane board          | 54.9    |                     |
| 71   | 33930    | Polishing stone & paper             | 54.1    |                     |
| 72   | 35022    | Tool                                | 53.3    |                     |
| 73   | 23210    | Cotton fabrics                      | 53.1    |                     |
| 74   | 38201    | Railroad equipment                  | 51.4    | (4.92)              |
| 75   | 37031    | Electric apparatus                  | 51.3    |                     |
| 76   | 25200    | Plywood                             | 50.4    |                     |
| 77   | 23110    | Cotton yarn                         | 50.1    |                     |
| 78   | 25300    | Wood cork and tub                   | 50.1    |                     |
| 79   | 23141    | Hemp & flax yarn                    | 50.0    | (0.39)              |
| 80   | 23221    | Silk fabrics                        | 50.0    |                     |
| 81   | 36061    | Sewing machines                     | 49.9    |                     |
| 82   | 23143    | Chemical fibre yarn                 | 49.6    |                     |

| Rank | I-O Code | Item                                  | $t_j^1$ | Share of output (%) |
|------|----------|---------------------------------------|---------|---------------------|
| 83   | 23999    | Miscellaneous textile products        | 49.4    | (1.76)              |
| 84   | 23222    | Staple fibre fabrics                  | 49.0    |                     |
| 85   | 20993    | Edible vegetable oils                 | 48.0    |                     |
| 86   | 27210    | Wall, floor & window paper            | 47.9    |                     |
| 87   | 35023    | Miscellaneous metal products          | 47.9    |                     |
| 88   | 04120    | Laver & oyster                        | 45.0    | (1.15)              |
| 89   | 01122    | Miscellaneous cereals                 | 43.2    |                     |
| 90   | 25400    | Bamboo & cork products                | 42.9    |                     |
| 91   | 25900    | Other wood products                   | 41.5    |                     |
| 92   | 39902    | Bristle                               | 41.3    |                     |
| 93   | 20920    | Starch                                | 41.0    | (12.53)             |
| 94   | 01145    | Appreciation plant                    | 40.2    |                     |
| 95   | 01142    | Perilla frutescens & castor beans     | 40.0    |                     |
| 96   | 01123    | Potatoes                              | 39.8    |                     |
| 97   | 01144    | Ginseng & pyrethrum flower            | 39.7    |                     |
| 98   | 28001    | Newspaper                             | 39.7    | (3.85)              |
| 99   | 01124    | Vegetables                            | 38.5    |                     |
| 100  | 31202    | Fats                                  | 38.5    |                     |
| 101  | 33220    | Glass products                        | 37.9    |                     |
| 102  | 20320    | Wheat flour                           | 37.6    |                     |
| 103  | 33992    | Asbestos products                     | 37.2    | (3.82)              |
| 104  | 31130    | Dye stuffs                            | 37.0    |                     |
| 105  | 31201    | Oils                                  | 37.0    |                     |
| 106  | 27120    | Newsprint woodfree & kraft paper      | 36.6    |                     |
| 107  | 23500    | Ropes & fishing nets                  | 36.4    |                     |
| 108  | 02120    | Charcoal & firewood                   | 35.7    | (30.03)             |
| 109  | 31141    | Explosives                            | 35.6    |                     |
| 110  | 04110    | Fishery                               | 35.4    |                     |
| 111  | 36031    | Farming machines                      | 35.1    |                     |
| 112  | 31112    | Sulphuric acid                        | 35.0    | (3.85)              |
| 113  | 34250    | Non-ferrous metallic cast products.   | 34.3    |                     |
| 114  | 37013    | Electric motor                        | 34.1    |                     |
| 115  | 01149    | Miscellaneous special crops           | 33.3    |                     |
| 116  | 26001    | Wood-made furnitures                  | 32.5    |                     |
| 117  | 39905    | Synthetic resin products              | 32.5    | (3.82)              |
| 118  | 35012    | Structural metal products             | 32.1    |                     |
| 119  | 37014    | Other industrial electric machinery.  | 31.3    |                     |
| 120  | 20101    | Slaughtering                          | 31.1    |                     |
| 121  | 36070    | Machine parts                         | 30.2    |                     |
| 122  | 15000    | Raw salt                              | 30.0    | (3.82)              |
| 123  | 20992    | Edible salt                           | 30.0    |                     |
| 124  | 31113    | Hydrochloric acid                     | 30.0    |                     |
| 125  | 37022    | Household electric appliance          | 30.0    |                     |
| 126  | 34230    | Non-ferrous metallic rolled products. | 29.4    |                     |
| 127  | 34210    | Copper                                | 28.8    | (3.82)              |
| 128  | 37033    | Machine for post and telegraph        | 28.0    |                     |
| 129  | 37012    | Transformer & socket                  | 27.8    |                     |
| 130  | 33999    | Other clay & stone products           | 27.6    |                     |
| 131  | 01152    | Hen, duck, turkey & geese             | 27.5    |                     |
| 132  | 01121    | Pulses                                | 27.3    | (30.03)             |
| 133  | 36034    | Special industry machine              | 27.2    |                     |
| 134  | 34131    | Steel pipes                           | 26.0    |                     |
| 135  | 32300    | Petroleum products                    | 25.1    |                     |
| 136  | 19300    | Talc                                  | 25.0    | (30.03)             |
| 137  | 19400    | Fluorspar                             | 25.0    |                     |
| 138  | 31910    | Pharmaceutical preparation            | 25.0    |                     |
| 139  | 33991    | Carbon products                       | 25.0    |                     |
| 140  | 34133    | Cast iron pipe                        | 25.0    |                     |
| 141  | 38130    | Wooden ship building                  | 25.0    | (30.03)             |
| 142  | 39121    | Medical instrument                    | 24.6    |                     |
| 143  | 01111    | Rice                                  | 24.4    |                     |
| 144  | 31921    | Soap                                  | 24.0    |                     |
| 145  | 30001    | Rubber products                       | 23.7    |                     |
| 146  | 31115    | Soda products                         | 23.7    |                     |

| Rank | I-O Code | Item                                | $t_j^1$ | Share of output (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 147  | 31191    | Inorganic chemicals                 | 21.9    |                     |
| 148  | 34151    | Forged steel                        | 21.6    |                     |
| 149  | 14000    | Sand & stone                        | 21.5    |                     |
| 150  | 34120    | Rolled steel                        | 21.1    |                     |
| 151  | 36033    | Textile machines                    | 21.0    |                     |
| 152  | 01170    | Cocoon                              | 20.0    |                     |
| 153  | 20995    | Combined feed                       | 20.0    |                     |
| 154  | 31111    | Ammonia                             | 20.0    |                     |
| 155  | 32210    | Briquet                             | 20.0    |                     |
| 156  | 32900    | Coal products                       | 20.0    |                     |
| 157  | 39300    | Precious metals & jewels            | 20.0    | (5.77)              |
| 158  | 20500    | Sugars                              | 19.8    |                     |
| 159  | 38120    | Steel ship building                 | 19.2    |                     |
| 160  | 37035    | Electric cable                      | 18.5    |                     |
| 161  | 36011    | Prime mover & boiler                | 18.3    |                     |
| 162  | 36041    | General purpose industrial machine  | 18.0    |                     |
| 163  | 01141    | Cotton & hemp                       | 17.5    |                     |
| 164  | 01112    | Barley & wheat                      | 17.0    |                     |
| 165  | 31192    | Oxygen, acetylene & dry ice         | 15.4    |                     |
| 166  | 37034    | Watt meter                          | 15.2    |                     |
| 167  | 11100    | Anthracite                          | 15.0    |                     |
| 168  | 19200    | Kaolin                              | 15.0    |                     |
| 169  | 19500    | Lime stone                          | 15.0    |                     |
| 170  | 31114    | Calcium carbide                     | 15.0    |                     |
| 171  | 33400    | Cement                              | 15.0    |                     |
| 172  | 35011    | Gate                                | 15.0    |                     |
| 173  | 39111    | Scientific instruments              | 15.0    |                     |
| 174  | 34229    | Other non-ferrous metals            | 14.9    |                     |
| 175  | 33102    | Fire clay products                  | 13.9    |                     |
| 176  | 23400    | Knitting mill products              | 13.8    |                     |
| 177  | 19900    | Miscellaneous non-metallic minerals | 13.7    | (10.16)             |
| 178  | 02112    | Forest products                     | 12.0    |                     |
| 179  | 01159    | Other livestock                     | 11.2    |                     |
| 180  | 25100    | Sawmills                            | 10.8    |                     |
| 181  | 38110    | Ship motor                          | 10.8    |                     |
| 182  | 19100    | Graphite                            | 10.2    |                     |
| 183  | 01153    | Pig                                 | 10.1    |                     |
| 184  | 02111    | Forest                              | 10.0    |                     |
| 185  | 12240    | Copper ore                          | 10.0    |                     |
| 186  | 34111    | Pig iron                            | 10.0    |                     |
| 187  | 34112    | Crude steel                         | 10.0    | (1.00)              |
| 188  | 34132    | Cast steel                          | 10.0    |                     |
| 189  | 01151    | Dairy cattle                        | 8.3     |                     |
| 190  | 31181    | Chemical fertilizer                 | 6.3     |                     |
| 191  | 36021    | Working machines                    | 5.3     |                     |
| 192  | 36022    | Metal processing machine            | 5.0     | (0.07)              |
| 193  | 36032    | Mining & construction machines      | 5.0     |                     |
| 194  | 11200    | Peat & sub-bituminous coal          | —       |                     |
| 195  | 12100    | Iron ore                            | —       |                     |
| 196  | 12210    | Tungsten ore                        | —       |                     |
| 197  | 12220    | Manganese ore                       | —       |                     |
| 198  | 12230    | Gold & silver ores                  | —       |                     |
| 199  | 12250    | Lead ore                            | —       |                     |
| 200  | 12260    | Zinc ore                            | —       |                     |
| 201  | 12290    | Miscellaneous metallic ores         | —       |                     |
| 202  | 13000    | Rare element ores                   | —       |                     |
| 203  | 20310    | Grain milling                       | —       |                     |
| 204  | 20800    | Ice                                 | —       | (5.41)              |
| 205  | 20930    | Bean curd                           | —       |                     |
| 206  | 20940    | Bean sprout                         | —       |                     |
| 207  | 20991    | Maltose                             | —       |                     |
| 208  | 21300    | Clean & unrefined rice wine         | —       |                     |
| 209  | 21400    | Sake                                | —       |                     |
| 210  | 23142    | Staple fibre yarn                   | —       |                     |

| Rank | I-O Code | Item                                | $t_j^1$ | Share of output (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 211  | 23920    | Straw bags & rope                   | —       | }                   |
| 212  | 23991    | Cotton                              | —       |                     |
| 213  | 27170    | Window paper                        | —       |                     |
| 214  | 27180    | Asphalt roofing & water proof paper | —       |                     |
| 215  | 31189    | Other fertilizer                    | —       |                     |
| 216  | 34160    | Galvanized steel pipe               | —       |                     |
| 217  | 37011    | Generator                           | —       |                     |
| 218  | 38400    | Motor vehicle repairing             | —       |                     |
| 219  | 88001    | Metal scrap                         | —       |                     |
| 220  | 88002    | Other scrap                         | —       |                     |

Table VII.  $t_j^2$  Rankings

| Rank | I-O Code | Item                            | $t_j^2$ | Share of output (%) |
|------|----------|---------------------------------|---------|---------------------|
| 1    | 39500    | Lacquerware                     | 102.4   | (0.02)              |
| 2    | 39211    | Optical instrument              | 96.1    | (0.02)              |
| 3    | 21101    | Alcohol                         | 87.0    | }                   |
| 4    | 31113    | Hydrochloric acid               | 87.0    |                     |
| 5    | 22000    | Cigarette                       | 74.9    | (2.28)              |
| 6    | 20920    | Starch                          | 68.1    | (0.16)              |
| 7    | 25200    | Plywood                         | 64.2    | }                   |
| 8    | 21200    | Beer                            | 64.0    |                     |
| 9    | 01143    | Tobacco & peppermint            | 62.6    |                     |
| 10   | 31910    | Pharmaceutical preparation      | 54.0    | (1.27)              |
| 11   | 37035    | Electric cable                  | 49.0    | }                   |
| 12   | 31201    | Oils                            | 48.5    |                     |
| 13   | 37013    | Electric motor                  | 46.0    |                     |
| 14   | 23130    | Woolen & worsted yarn           | 41.7    | }                   |
| 15   | 23221    | Silk fabrics                    | 41.0    |                     |
| 16   | 37022    | Household electric appliance    | 40.3    |                     |
| 17   | 31921    | Soap                            | 39.9    | }                   |
| 18   | 34210    | Copper                          | 39.8    |                     |
| 19   | 23224    | Chemical fibre fabrics          | 38.4    |                     |
| 20   | 20222    | Sea food                        | 38.2    |                     |
| 21   | 31925    | Matches                         | 35.0    | }                   |
| 22   | 31121    | Basic organic chemicals         | 34.6    |                     |
| 23   | 19300    | Talc                            | 34.0    |                     |
| 24   | 27210    | Wall, floor & window paper      | 34.0    |                     |
| 25   | 33210    | Plate glass                     | 32.4    |                     |
| 26   | 21909    | Miscellaneous liquors           | 28.3    | }                   |
| 27   | 31130    | Dyestuffs                       | 28.0    |                     |
| 28   | 31191    | Inorganic chemicals             | 27.0    |                     |
| 29   | 27240    | Notebook & paper for office use | 26.8    |                     |
| 30   | 20221    | Canned sea food                 | 25.5    |                     |
| 31   | 31923    | Printing ink                    | 25.2    |                     |
| 32   | 38300    | Motor vehicles                  | 24.6    | }                   |
| 33   | 20400    | Bread & confectioneries         | 24.0    |                     |
| 34   | 01121    | Pulses                          | 23.7    |                     |
| 35   | 20102    | Canned, processed meat          | 23.3    |                     |
| 36   | 37012    | Transformer & socket            | 22.9    |                     |
| 37   | 31300    | Paint                           | 22.8    |                     |
| 38   | 24901    | Finished textile products       | 22.0    |                     |

| Rank | I-O Code | Item                                | $t_j^2$ | Share of output (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 39   | 35021    | Household metallic products         | 19.1    | (4.28)              |
| 40   | 02111    | Forest                              | 19.0    |                     |
| 41   | 20994    | Tea                                 | 19.0    |                     |
| 42   | 23110    | Cotton yarn                         | 18.7    |                     |
| 43   | 20995    | Combined feed                       | 18.5    |                     |
| 44   | 39212    | Photographic materials              | 18.4    |                     |
| 45   | 39122    | Sanitary materials                  | 18.0    |                     |
| 46   | 39906    | Stationery                          | 18.0    |                     |
| 47   | 39903    | Toys & sporting goods               | 17.7    |                     |
| 48   | 20710    | Soy sauce & bean paste              | 17.1    |                     |
| 49   | 20999    | Other processed food                | 16.9    |                     |
| 50   | 33300    | Pottery                             | 16.9    |                     |
| 51   | 35022    | Tool                                | 16.5    |                     |
| 52   | 39904    | Musical instruments                 | 16.1    |                     |
| 53   | 20211    | Canned fruits & vegetables          | 16.0    |                     |
| 54   | 34151    | Forged steel                        | 15.7    |                     |
| 55   | 20219    | Other processed fruits & vegetables | 15.0    |                     |
| 56   | 36051    | Office machines                     | 15.0    | (4.92)              |
| 57   | 39701    | Watch                               | 13.9    |                     |
| 58   | 25900    | Other wood products                 | 13.4    |                     |
| 59   | 23143    | Chemical fibre yarn                 | 13.2    |                     |
| 60   | 23500    | Ropes & fishing nets                | 13.2    |                     |
| 61   | 31929    | Other chemical products             | 12.7    |                     |
| 62   | 33101    | Structural clay products            | 12.2    |                     |
| 63   | 33930    | Polishing stone & paper             | 12.2    |                     |
| 64   | 20223    | Preserved sea food                  | 11.7    |                     |
| 65   | 24300    | Wearing apparel & accessories       | 11.5    |                     |
| 66   | 23222    | Staple fibre fabrics                | 11.0    |                     |
| 67   | 31181    | Chemical fertilizer                 | 10.8    |                     |
| 68   | 34131    | Steel pipes                         | 10.4    |                     |
| 69   | 29100    | Leather                             | 10.3    |                     |
| 70   | 20103    | Dairy products                      | 10.1    |                     |
| 71   | 23141    | Hemp & flax yarn                    | 10.0    | (10.28)             |
| 72   | 35012    | Structural metal products           | 10.0    |                     |
| 73   | 26001    | Wood-made furnitures                | 9.8     |                     |
| 74   | 28009    | Other printing & publishing         | 9.8     |                     |
| 75   | 25300    | Wood box & tub                      | 9.1     |                     |
| 76   | 23999    | Miscellaneous textile products      | 8.2     |                     |
| 77   | 27230    | Paper case & bag                    | 8.1     |                     |
| 78   | 39112    | Measuring instrument                | 8.1     |                     |
| 79   | 20996    | Malt                                | 8.0     |                     |
| 80   | 39901    | Umbrella & parasol                  | 7.8     |                     |
| 81   | 27120    | Newsprint woodfree & kraft paper    | 7.6     |                     |
| 82   | 01130    | Fruits                              | 7.1     |                     |
| 83   | 19900    | Miscellaneous non-metallic minerals | 6.9     |                     |
| 84   | 27160    | Manila board & plane board          | 6.7     |                     |
| 85   | 20320    | Wheat flour                         | 6.3     |                     |
| 86   | 23210    | Cotton fabrics                      | 6.3     |                     |
| 87   | 37021    | Electric bulb & fluorescent tube    | 5.9     |                     |
| 88   | 25400    | Bamboo & cork products              | 5.8     |                     |
| 89   | 23230    | Woolen & worsted fabrics            | 5.6     |                     |
| 90   | 37031    | Electric apparatus                  | 5.6     |                     |
| 91   | 30001    | Rubber products                     | 5.4     |                     |
| 92   | 02112    | Forest products                     | 5.3     |                     |
| 93   | 23120    | Raw silk                            | 5.3     |                     |
| 94   | 38510    | Bicycle & rear-car                  | 5.1     |                     |
| 95   | 35023    | Miscellaneous metal products        | 4.9     |                     |
| 96   | 36061    | Sewing machines                     | 4.9     |                     |
| 97   | 01124    | Vegetables                          | 4.8     |                     |
| 98   | 39121    | Medical instrument                  | 4.8     |                     |
| 99   | 39907    | Accessories                         | 4.7     |                     |
| 100  | 31115    | Soda products                       | 4.6     |                     |
| 101  | 01153    | Pig                                 | 4.4     |                     |
| 102  | 37034    | Watt-meter                          | 4.2     |                     |
| 103  | 38120    | Steel ship building                 | 4.0     |                     |

| Rank | I-O Code | Item  | $t_j^2$ | Share of<br>output (%) |
|------|----------|---|---------|------------------------|
| 104  | 21600    | Soft drinks                                     | 3.9     | (53.40)                |
| 105  | 34230    | Non-ferrous metallic rolled products            | 3.9     |                        |
| 106  | 31924    | Pesticide                                       | 3.9     |                        |
| 107  | 20101    | Slaughtering                                    | 3.8     |                        |
| 108  | 25100    | Sawmills  | 3.5     |                        |
| 109  | 01145    | Appreciation plant                              | 3.3     |                        |
| 110  | 33220    | Glass products                                  | 3.3     |                        |
| 111  | 31202    | Fats  | 3.2     |                        |
| 112  | 31192    | Oxygen, acetylene                               | 3.1     |                        |
| 113  | 23400    | Knitting mill products                          | 2.9     |                        |
| 114  | 34120    | Rolled steel                                    | 2.9     |                        |
| 115  | 32900    | Coal products                                   | 2.3     |                        |
| 116  | 36034    | Special industry machine                        | 2.0     |                        |
| 117  | 36031    | Farming machines                                | 1.7     |                        |
| 118  | 26002    | Metallic furnitures                             | 1.6     |                        |
| 119  | 36011    | Prime mover & boiler                            | 1.6     |                        |
| 120  | 23240    | Hemp fabrics                                    | 1.3     |                        |
| 121  | 31141    | Explosives                                      | 1.3     |                        |
| 122  | 34250    | Non-ferrous metallic cast products              | 1.3     |                        |
| 123  | 01152    | Hen, duck, turkey & geese                       | 1.2     |                        |
| 124  | 33992    | Asbestos products                               | 1.2     |                        |
| 125  | 36070    | Machine parts                                   | 1.2     |                        |
| 126  | 37014    | Other industrial electric machinery & equipment | 1.2     |                        |
| 127  | 01141    | Cotton & hemp                                   | 1.1     |                        |
| 128  | 04110    | Fishery   | 1.1     |                        |
| 129  | 32300    | Petroleum products                              | 1.1     |                        |
| 130  | 15000    | Raw salt  | 1.0     |                        |
| 131  | 20600    | Sugar confectioneries                           | 1.0     |                        |
| 132  | 33400    | Cement  | 1.0     |                        |
| 133  | 01111    | Rice  | 0.9     |                        |
| 134  | 01112    | Barley & wheat                                  | 0.8     |                        |
| 135  | 20910    | Noodle & vermicelli                             | 0.8     |                        |
| 136  | 34112    | Crude steel                                     | 0.8     |                        |
| 137  | 01144    | Ginseng & pyrethrum flower                      | 0.7     |                        |
| 138  | 28001    | Newspaper                                       | 0.7     |                        |
| 139  | 39902    | Bristle   | 0.7     |                        |
| 140  | 39909    | Miscellaneous manufacturing                     | 0.7     |                        |
| 141  | 01149    | Miscellaneous special crops                     | 0.6     |                        |
| 142  | 24111    | Leather shoes                                   | 0.6     |                        |
| 143  | 36033    | Textile machines                                | 0.5     |                        |
| 144  | 14000    | Sand & stone                                    | 0.4     |                        |
| 145  | 34111    | Pig iron  | 0.4     |                        |
| 146  | 01159    | Other livestock & poultry                       | 0.3     |                        |
| 147  | 02120    | Charcoal & firewood                             | 0.3     |                        |
| 148  | 20790    | Miscellaneous seasoning                         | 0.3     |                        |
| 149  | 33999    | Other clay & stone products                     | 0.3     |                        |
| 150  | 01122    | Miscellaneous cereals                           | 0.2     |                        |
| 151  | 20500    | Sugars  | 0.2     |                        |
| 152  | 01151    | Dairy cattle                                    | 0.1     |                        |
| 153  | 01123    | Potatoes  | —       |                        |
| 154  | 01142    | Perilla frutescens & castor beans               | —       |                        |
| 155  | 01170    | Cocoon  | —       |                        |
| 156  | 04120    | Laver & oyster                                  | —       |                        |
| 157  | 11100    | Anthraxite                                      | —       |                        |
| 158  | 11200    | Peat & sub-bituminous coal                      | —       |                        |
| 159  | 12100    | Iron ore  | —       |                        |
| 160  | 12210    | Tungsten ore                                    | —       |                        |
| 161  | 12220    | Manganese ore                                   | —       |                        |
| 162  | 12230    | Gold & silver ores                              | —       |                        |
| 163  | 12240    | Copper ore                                      | —       |                        |
| 164  | 12250    | Lead ore  | —       |                        |
| 165  | 12260    | Zinc ore  | —       |                        |
| 166  | 12290    | Miscellaneous metallic ores                     | —       |                        |
| 167  | 13000    | Rare element ores                               | —       |                        |
| 168  | 19100    | Graphite  | —       |                        |
| 169  | 19200    | Kaolin  | —       |                        |



| Rank | I-O Code | Item   | $t_j^2$ | Share of output (%) |
|------|----------|--|---------|---------------------|
| 170  | 19400    | Fluorspar                                      | —       | (15.78)             |
| 171  | 19500    | Lime stone                                     | —       |                     |
| 172  | 20310    | Grain milling                                  | —       |                     |
| 173  | 20800    | Ice  | —       |                     |
| 174  | 20930    | Bean curd                                      | —       |                     |
| 175  | 20940    | Bean sprout                                    | —       |                     |
| 176  | 20991    | Maltose  | —       |                     |
| 177  | 20992    | Edible salt                                    | —       |                     |
| 178  | 20993    | Edible vegetable oils                          | —       |                     |
| 179  | 21103    | Distilled spirits                              | —       |                     |
| 180  | 21300    | Clean & unrefined rice wine                    | —       |                     |
| 181  | 21400    | Sake   | —       |                     |
| 182  | 21901    | Fruit wine                                     | —       |                     |
| 183  | 23142    | Staple fibre yarn                              | —       |                     |
| 184  | 23910    | Straw seats                                    | —       |                     |
| 185  | 23920    | Straw bags & rope                              | —       |                     |
| 186  | 23991    | Cotton   | —       |                     |
| 187  | 27170    | Window paper                                   | —       |                     |
| 188  | 27180    | Asphalt roofing & water proof paper            | —       |                     |
| 189  | 29200    | Leather products                               | —       |                     |
| 190  | 30002    | Rubber shoes                                   | —       |                     |
| 191  | 31111    | Ammonia  | —       |                     |
| 192  | 31112    | Sulfuric acid                                  | —       |                     |
| 193  | 31114    | Calcium carbide                                | —       |                     |
| 194  | 31189    | Other fertilizer                               | —       |                     |
| 195  | 31992    | Toilet articles                                | —       | (15.78)             |
| 196  | 32210    | Briquet  | —       |                     |
| 197  | 33102    | Fire clay products                             | —       |                     |
| 198  | 33500    | Cement products                                | —       |                     |
| 199  | 33991    | Carbon products                                | —       |                     |
| 200  | 34132    | Cast steel                                     | —       |                     |
| 201  | 34133    | Cast iron pipe                                 | —       |                     |
| 202  | 34160    | Galvanized steel pipe                          | —       |                     |
| 203  | 34229    | Other non-ferrous metals                       | —       |                     |
| 204  | 35011    | Gate   | —       |                     |
| 205  | 36022    | Metal processing machines                      | —       |                     |
| 206  | 36021    | Working machines                               | —       |                     |
| 207  | 36032    | Mining & construction machines                 | —       |                     |
| 208  | 36041    | General purpose industrial machine & equipment | —       |                     |
| 209  | 37011    | Generator                                      | —       |                     |
| 210  | 37033    | Machine for post & telegraph                   | —       |                     |
| 211  | 38130    | Wooden ship building                           | —       |                     |
| 212  | 38201    | Railroad equipment                             | —       |                     |
| 213  | 38300    | Motor vehicles                                 | —       |                     |
| 214  | 38400    | Motor vehicle repairing                        | —       |                     |
| 215  | 38901    | Other transport equipment                      | —       |                     |
| 216  | 39111    | Scientific instrument                          | —       |                     |
| 217  | 39300    | Precious metals & jewels                       | —       |                     |
| 218  | 39905    | Synthetic resin products                       | —       |                     |
| 219  | 88001    | Metal scrap                                    | —       |                     |
| 220  | 88002    | Other scrap                                    | —       |                     |

Table VIII.  $t_j^3$  Rankings

| Rank | I-O Code | Item                             | $t_j^3$ | Share of output (%) |
|------|----------|----------------------------------|---------|---------------------|
| 1    | 23130    | Woolen & worsted yarn            | 70.0    | (0.84)              |
| 2    | 24901    | Finished textile products        | 49.4    | (1.99)              |
| 3    | 23500    | Ropes & fishing nets             | 47.9    |                     |
| 4    | 32300    | Petroleum products               | 47.2    |                     |
| 5    | 21101    | Alcohol                          | 44.5    |                     |
| 6    | 23999    | Miscellaneous textile products   | 41.3    |                     |
| 7    | 23400    | Knitting mill products           | 41.2    |                     |
| 8    | 23222    | Staple fibre fabrics             | 40.0    | (1.02)              |
| 9    | 20500    | Sugars                           | 39.8    |                     |
| 10   | 21901    | Fruit wine                       | 38.2    |                     |
| 11   | 31910    | Pharmaceutical preparation       | 29.5    | (4.53)              |
| 12   | 21200    | Beer                             | 28.1    |                     |
| 13   | 21400    | Sake                             | 27.8    |                     |
| 14   | 24300    | Wearing apparel & accessories    | 27.7    |                     |
| 15   | 20103    | Dairy products                   | 27.4    |                     |
| 16   | 39903    | Toys & sporting goods            | 22.4    | (1.38)              |
| 17   | 38510    | Bicycle & rear-car               | 21.0    |                     |
| 18   | 23143    | Chemical fibre yarn              | 20.0    | (7.35)              |
| 19   | 23224    | Chemical fibre fabrics           | 19.5    |                     |
| 20   | 20994    | Tea                              | 16.3    |                     |
| 21   | 20999    | Other processed food             | 16.1    |                     |
| 22   | 23240    | Hemp fabrics                     | 16.1    |                     |
| 23   | 31113    | Hydrochloric acid                | 13.9    |                     |
| 24   | 31929    | Other chemical products          | 13.6    |                     |
| 25   | 31141    | Explosives                       | 12.0    |                     |
| 26   | 23221    | Silk fabrics                     | 11.4    |                     |
| 27   | 20920    | Starch                           | 10.9    |                     |
| 28   | 23141    | Hemp & flax yarn                 | 10.0    | (7.35)              |
| 29   | 23142    | Staple fibre yarn                | 10.0    |                     |
| 30   | 29100    | Leather                          | 10.0    |                     |
| 31   | 31192    | Oxygen, acetylene & dry ice      | 10.0    |                     |
| 32   | 39300    | Precious metal & jewels          | 10.0    |                     |
| 33   | 39500    | Lacquer ware                     | 10.0    |                     |
| 34   | 23110    | Cotton yarn                      | 9.9     |                     |
| 35   | 33210    | Plate glass                      | 9.9     |                     |
| 36   | 21909    | Miscellaneous liquors            | 9.7     |                     |
| 37   | 25200    | Plywood                          | 9.6     |                     |
| 38   | 26002    | Metallic furnitures              | 9.2     | (7.35)              |
| 39   | 31115    | Soda products                    | 8.8     |                     |
| 40   | 35021    | Household metallic products      | 8.7     |                     |
| 41   | 31191    | Inorganic chemicals              | 8.6     |                     |
| 42   | 31921    | Soap                             | 8.6     |                     |
| 43   | 39907    | Accessories                      | 8.0     |                     |
| 44   | 37022    | Household electric appliance     | 7.5     |                     |
| 45   | 27210    | Wall, floor & window paper       | 7.1     |                     |
| 46   | 21300    | Clean & unrefined rice wine      | 6.8     |                     |
| 47   | 33500    | Cement products                  | 6.3     |                     |
| 48   | 38300    | Motor vehicles                   | 6.3     | (7.35)              |
| 49   | 88001    | Metal scrap                      | 6.2     |                     |
| 50   | 88002    | Other scrap                      | 5.9     |                     |
| 51   | 27240    | Note book & paper for office use | 5.6     |                     |
| 52   | 33400    | Cement                           | 5.0     |                     |
| 53   | 21103    | Distilled spirits                | 4.5     |                     |
| 54   | 27230    | Paper case & bag                 | 4.3     |                     |
| 55   | 20996    | Malt                             | 4.2     |                     |
| 56   | 23210    | Cotton fabrics                   | 4.1     |                     |
| 57   | 23230    | Woolen & worsted fabrics         | 4.1     |                     |
| 58   | 01130    | Fruits                           | 4.0     |                     |
| 59   | 34160    | Galvanized steel pipe            | 4.0     |                     |

| Rank | I-O Code | Item                                 | $\frac{1}{J}$ | Share of output (%) |
|------|----------|--------------------------------------|---------------|---------------------|
| 60   | 34230    | Non-ferrous metallic rolled products | 3.5           | (10.90)             |
| 61   | 20219    | Other processed fruits & vegetables  | 3.4           |                     |
| 62   | 29200    | Leather products                     | 3.4           |                     |
| 63   | 39906    | Stationery                           | 3.4           |                     |
| 64   | 33220    | Glass products                       | 3.2           |                     |
| 65   | 37021    | Electric bulb & fluorescent tube     | 3.0           |                     |
| 66   | 27160    | Manila board & plane board           | 2.5           |                     |
| 67   | 36061    | Sewing machines                      | 2.4           |                     |
| 68   | 20101    | Slaughtering                         | 2.3           |                     |
| 69   | 27120    | Newsprint woodfree & kraft paper     | 2.3           |                     |
| 70   | 26001    | Wood-made furnitures                 | 2.1           |                     |
| 71   | 30001    | Rubber products                      | 2.1           |                     |
| 72   | 21600    | Soft drinks                          | 1.5           |                     |
| 73   | 31121    | Basic organic chemicals              | 1.4           |                     |
| 74   | 39904    | Musical instruments                  | 1.4           |                     |
| 75   | 33300    | Pottery                              | 1.1           |                     |
| 76   | 31130    | Dye stuffs                           | 0.9           |                     |
| 77   | 01141    | Cotton & hemp                        | 0.5           |                     |
| 78   | 35012    | Structural metal products            | 0.3           |                     |
| 79   | 01111    | Rice                                 | —             |                     |
| 80   | 01112    | Barley & wheat                       | —             |                     |
| 81   | 01121    | Pulses                               | —             |                     |
| 82   | 01122    | Miscellaneous cereals                | —             |                     |
| 83   | 01123    | Potatoes                             | —             |                     |
| 84   | 01124    | Vegetables                           | —             |                     |
| 85   | 01142    | Perilla frutescens & castor beans    | —             |                     |
| 86   | 01143    | Tobacco & peppermint                 | —             |                     |
| 87   | 01144    | Ginseng & Pyrethrum flower           | —             |                     |
| 88   | 01145    | Appreciation plant                   | —             |                     |
| 89   | 01149    | Miscellaneous special crops          | —             |                     |
| 90   | 01151    | Dairy cattle                         | —             |                     |
| 91   | 01152    | Hen, Duck, turkey & Geese            | —             |                     |
| 92   | 01153    | Pig                                  | —             |                     |
| 93   | 01159    | Other livestock & poultry            | —             |                     |
| 94   | 01170    | Cocoon                               | —             |                     |
| 95   | 02111    | Forest                               | —             |                     |
| 96   | 02112    | Forest products                      | —             |                     |
| 97   | 02120    | Charcoal & firewood                  | —             |                     |
| 98   | 04110    | Fishery                              | —             |                     |
| 99   | 04120    | Laver & oyster                       | —             |                     |
| 100  | 11100    | Anthracite                           | —             |                     |
| 101  | 11200    | Peat & sub-bituminous coal           | —             |                     |
| 102  | 12100    | Iron ore                             | —             |                     |
| 103  | 12210    | Tungsten ore                         | —             |                     |
| 104  | 12220    | Manganese ore                        | —             |                     |
| 105  | 12230    | Gold & silver ores                   | —             |                     |
| 106  | 12250    | Lead ore                             | —             |                     |
| 107  | 13240    | Copper ore                           | —             |                     |
| 108  | 12260    | Zinc ore                             | —             |                     |
| 109  | 12290    | Miscellaneous metallic ores          | —             |                     |
| 110  | 13000    | Rare element ores                    | —             |                     |
| 111  | 14000    | Sand & stone                         | —             |                     |
| 112  | 15000    | Raw salt                             | —             |                     |
| 113  | 19100    | Graphite                             | —             |                     |
| 114  | 19200    | Kaolin                               | —             |                     |
| 115  | 19300    | Talc                                 | —             |                     |
| 116  | 19400    | Fluorspar                            | —             |                     |
| 117  | 19500    | Lime stone                           | —             |                     |
| 118  | 19900    | Miscellaneous non-metallic minerals  | —             |                     |
| 119  | 20102    | Canned, processed meat               | —             |                     |
| 120  | 20211    | Canned fruits & vegetables           | —             |                     |
| 121  | 20221    | Canned sea food                      | —             |                     |
| 122  | 20222    | Sea food                             | —             |                     |
| 123  | 20223    | Preserved sea food                   | —             |                     |
| 124  | 20310    | Grain milling                        | —             |                     |
| 125  | 20320    | Wheat flour                          | —             |                     |

| Rank | I-O Code | Item                                | $t_j^3$ | Share of output (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 126  | 20400    | Bread & confectioneries             | —       | (72.0)              |
| 127  | 20600    | Sugar confectioneries               | —       |                     |
| 128  | 20710    | Soy sauce & bean paste              | —       |                     |
| 129  | 20790    | Miscellaneous seasoning             | —       |                     |
| 130  | 20800    | Ice                                 | —       |                     |
| 131  | 20910    | Noodle & vermicelli                 | —       |                     |
| 132  | 20930    | Bean curd                           | —       |                     |
| 133  | 20940    | Bean sprout                         | —       |                     |
| 134  | 20991    | Maltose                             | —       |                     |
| 135  | 20992    | Edible salt                         | —       |                     |
| 136  | 20993    | Edible oils                         | —       |                     |
| 137  | 20995    | Combined feed                       | —       |                     |
| 138  | 22000    | Cigarette                           | —       |                     |
| 139  | 23120    | Raw silk                            | —       |                     |
| 140  | 23910    | Straw seats                         | —       |                     |
| 141  | 23920    | Straw bags & rope                   | —       |                     |
| 142  | 23991    | Cotton                              | —       |                     |
| 143  | 24111    | Leather shoes                       | —       |                     |
| 144  | 25100    | Sawmills                            | —       |                     |
| 145  | 25300    | Wood box & Tub                      | —       |                     |
| 146  | 25400    | Bamboo & cork products              | —       |                     |
| 147  | 25900    | Other wood products                 | —       |                     |
| 148  | 27170    | Window paper                        | —       |                     |
| 149  | 27180    | Asphalt roofing & water proof paper | —       |                     |
| 150  | 28001    | Newspaper                           | —       |                     |
| 151  | 28009    | Other printing & publishing         | —       |                     |
| 152  | 30002    | Rubber shoes                        | —       |                     |
| 153  | 31111    | Ammonia                             | —       |                     |
| 154  | 31112    | Sulfuric acid                       | —       |                     |
| 155  | 31114    | Calcium carbide                     | —       |                     |
| 156  | 31181    | Chemical fertilizer                 | —       |                     |
| 157  | 31189    | Other fertilizer                    | —       |                     |
| 158  | 31201    | Oils                                | —       |                     |
| 159  | 31202    | Fats                                | —       |                     |
| 160  | 31300    | Paint                               | —       |                     |
| 161  | 31923    | Printing ink                        | —       |                     |
| 162  | 31924    | Pesticide                           | —       |                     |
| 163  | 31925    | Matches                             | —       |                     |
| 164  | 31992    | Toilet articles                     | —       |                     |
| 165  | 32210    | Briquet                             | —       |                     |
| 166  | 32900    | Coal products                       | —       |                     |
| 167  | 33101    | Structural clay products            | —       |                     |
| 168  | 33102    | Fire clay products                  | —       |                     |
| 169  | 33930    | Polishing stone & paper             | —       |                     |
| 170  | 33991    | Carbon products                     | —       |                     |
| 171  | 33992    | Asbestos products                   | —       |                     |
| 172  | 33999    | Other clay & stone products         | —       |                     |
| 173  | 34111    | Pig iron                            | —       |                     |
| 174  | 34112    | Crude steel                         | —       |                     |
| 175  | 34120    | Rolled steel                        | —       |                     |
| 176  | 34131    | Steel pipes                         | —       |                     |
| 177  | 34132    | Cast steel                          | —       |                     |
| 178  | 34133    | Cast iron pipe                      | —       |                     |
| 179  | 34151    | Forged steel                        | —       |                     |
| 180  | 34210    | Copper                              | —       |                     |
| 181  | 34229    | Other non-ferrous metals            | —       | (72.0)              |
| 182  | 34250    | Non-ferrous metallic cast products  | —       |                     |
| 183  | 35011    | Gate                                | —       |                     |
| 184  | 35022    | Tool                                | —       |                     |
| 185  | 35023    | Miscellaneous metal products        | —       |                     |
| 186  | 36011    | Prime mover & boiler                | —       |                     |
| 187  | 36021    | Working machines                    | —       |                     |
| 188  | 36022    | Metal processing machines           | —       |                     |
| 189  | 36031    | Farming machines                    | —       |                     |
| 190  | 36032    | Mining & construction machines      | —       |                     |
| 191  | 36033    | Textile machines                    | —       |                     |
| 192  | 36034    | Special industry machines           | —       |                     |

| Rank | I-O Code | Item  | $t_j^3$ | Share of output (%) |
|------|----------|---|---------|---------------------|
| 193  | 36041    | General purpose industrial machine & equipment  | —       |                     |
| 194  | 36051    | Office machines                                 | —       |                     |
| 195  | 36070    | Machine parts                                   | —       |                     |
| 196  | 37011    | Generator                                       | —       |                     |
| 197  | 37012    | Transformer & socket                            | —       |                     |
| 198  | 37013    | Electric motor                                  | —       |                     |
| 199  | 37014    | Other industrial electric machinery & equipment | —       |                     |
| 200  | 37031    | Electric apparatus                              | —       |                     |
| 201  | 37033    | Machine for post & telegraph                    | —       |                     |
| 202  | 37034    | Watt-meter                                      | —       |                     |
| 203  | 37035    | Electric cable                                  | —       |                     |
| 204  | 38110    | Ship motor                                      | —       |                     |
| 205  | 38120    | Steel ship building & repairing                 | —       |                     |
| 206  | 38130    | Wooden ship building                            | —       |                     |
| 207  | 38201    | Railroad equipment                              | —       |                     |
| 208  | 38400    | Motor vehicle repairing                         | —       |                     |
| 209  | 38901    | Other transport equipment                       | —       |                     |
| 210  | 39111    | Scientific instrument                           | —       |                     |
| 211  | 39112    | Measuring instrument                            | —       |                     |
| 212  | 39121    | Medical instrument                              | —       |                     |
| 213  | 39211    | Optical instrument                              | —       |                     |
| 214  | 39122    | Sanitary materials                              | —       |                     |
| 215  | 39212    | Photographic materials                          | —       |                     |
| 216  | 39701    | Watch   | —       |                     |
| 217  | 39901    | Umbrella & parasol                              | —       |                     |
| 218  | 39902    | Bristle   | —       |                     |
| 219  | 39905    | Synthetic resin products                        | —       |                     |
| 220  | 39909    | Miscellaneous manufacturing                     | —       |                     |

Table X.  $t_i^{1+2}$  Rankings

| Rank | I-O Code | Item                                | $t_i^{1+2}$ | $t_i^1$ | $t_i^2$ | $t_i^3$ | Share of imports (%) |
|------|----------|-------------------------------------|-------------|---------|---------|---------|----------------------|
| 1    | 35012    | Structural metal products           | 444.4       | 437.6   | 6.8     | 0.3     | (0.60)               |
| 2    | 01143    | Tobacco & peppermint                | 312.1       | 249.7   | 62.4    | —       |                      |
| 3    | 23400    | Knitting mill products              | 309.0       | 16.4    | 292.6   | 41.2    |                      |
| 4    | 22000    | Cigarette                           | 240.8       | 240.4   | 0.4     | —       | (0.02)               |
| 5    | 24300    | Wearing apparel & accessories       | 213.7       | 208.9   | 4.8     | 27.7    |                      |
| 6    | 27230    | Paper case & bag                    | 212.4       | 73.6    | 138.8   | 4.3     |                      |
| 7    | 36011    | Prime mover & boiler                | 197.0       | 196.9   | 0.1     | —       | (0.10)               |
| 8    | 20222    | Sea food                            | 187.3       | 80.3    | 107.0   | —       |                      |
| 9    | 21901    | Fruit wine                          | 183.1       | 183.1   | —       | 38.2    |                      |
| 10   | 21200    | Beer                                | 182.2       | 182.1   | 0.1     | 28.1    |                      |
| 11   | 21909    | Miscellaneous liquors               | 178.1       | 177.9   | 1.2     | 9.7     |                      |
| 12   | 23210    | Cotton fabrics                      | 173.4       | 173.3   | 0.1     | 4.2     |                      |
| 13   | 20600    | Sugar confectioneries               | 144.4       | 100.6   | 43.4    | —       | (0.15)               |
| 14   | 21101    | Alcohol                             | 141.4       | 54.6    | 86.8    | 44.5    |                      |
| 15   | 33101    | Structural clay products            | 136.1       | 78.7    | 57.4    | —       |                      |
| 16   | 27240    | Note book & paper for office use    | 124.2       | 78.0    | 46.2    | 5.6     |                      |
| 17   | 21600    | Soft drinks                         | 122.5       | 70.5    | 52.0    | 1.5     |                      |
| 18   | 38510    | Bicycle & rear-car                  | 122.0       | 93.4    | 28.6    | 21.0    |                      |
| 19   | 31113    | Hydrochloric acid                   | 115.7       | 30.1    | 85.6    | 13.9    |                      |
| 20   | 24111    | Leather shoes                       | 114.3       | 99.7    | 14.6    | —       |                      |
| 21   | 31925    | Matches                             | 112.3       | 93.6    | 18.7    | —       |                      |
| 22   | 20996    | Malt                                | 106.9       | 90.1    | 16.8    | 4.2     |                      |
| 23   | 20920    | Starch                              | 106.7       | 40.6    | 66.1    | 10.9    |                      |
| 24   | 33210    | Plate glass                         | 105.5       | 76.9    | 28.6    | 9.9     |                      |
| 25   | 29200    | Leather products                    | 105.4       | 93.3    | 12.1    | 3.4     |                      |
| 26   | 20910    | Noodle & vermicelli                 | 102.9       | 102.3   | 0.6     | —       |                      |
| 27   | 20400    | Bread & confectioneries             | 101.6       | 98.7    | 2.9     | —       |                      |
| 28   | 39907    | Accessories                         | 101.0       | 80.3    | 20.7    | 8.0     |                      |
| 29   | 25200    | Plywood                             | 99.9        | 51.6    | 48.3    | 9.6     | (0.05)               |
| 30   | 20219    | Other processed fruits & vegetables | 99.0        | 98.5    | 0.5     | 3.4     |                      |
| 31   | 23224    | Chemical fibre fabrics              | 96.1        | 81.8    | 14.3    | 19.5    |                      |
| 32   | 27160    | Manila board & plane board          | 93.5        | 85.4    | 8.1     | 2.5     |                      |
| 33   | 01121    | Pulses                              | 92.6        | 63.5    | 29.1    | —       |                      |
| 34   | 33300    | Pottery                             | 92.3        | 48.0    | 44.3    | 1.1     |                      |
| 35   | 23999    | Miscellaneous textile products      | 91.1        | 61.2    | 29.9    | 41.3    | (0.27)               |
| 36   | 31923    | Printing ink                        | 91.0        | 58.9    | 32.1    | —       |                      |
| 37   | 90212    | Paper & manufactures thereof        | 88.4        | 38.1    | 50.3    | 2.2     |                      |
| 38   | 20223    | Preserved sea food                  | 86.7        | 85.2    | 1.5     | —       |                      |
| 39   | 35021    | Household metallic products         | 85.7        | 78.7    | 7.0     | 8.7     |                      |
| 40   | 31201    | Oils                                | 85.5        | 42.6    | 42.9    | —       |                      |
| 41   | 37022    | Household electric appliance        | 83.8        | 31.1    | 52.7    | 7.5     |                      |
| 42   | 20102    | Canned & processed meat             | 83.4        | 80.5    | 2.9     | —       |                      |
| 43   | 20994    | Tea                                 | 82.3        | 82.1    | 0.2     | 16.3    |                      |
| 44   | 37021    | Electric bulb & fluorescent tube    | 81.0        | 46.1    | 34.9    | 3.0     |                      |
| 45   | 39212    | Photographic materials              | 80.8        | 55.0    | 25.8    | —       | (0.58)               |
| 46   | 20710    | Soy sauce & bean paste              | 80.2        | 75.9    | 4.3     | —       |                      |
| 47   | 37035    | Electric copper wire & cable        | 79.6        | 36.6    | 43.0    | —       |                      |
| 48   | 23221    | Silk fabrics                        | 79.4        | 79.2    | 0.2     | 11.4    |                      |
| 49   | 23240    | Hemp fabrics                        | 79.3        | 74.7    | 4.6     | 16.1    |                      |
| 50   | 20790    | Miscellaneous seasoning             | 78.6        | 78.3    | 0.3     | —       |                      |
| 51   | 28009    | Other printing & publishing         | 78.4        | 68.0    | 10.4    | —       |                      |
| 52   | 27210    | Wall, floor & window paper          | 78.1        | 50.8    | 27.3    | 7.1     |                      |
| 53   | 39500    | Lacquer ware                        | 78.0        | 62.4    | 15.6    | 10.1    |                      |
| 54   | 23120    | Raw silk                            | 77.6        | 62.4    | 15.2    | —       |                      |
| 55   | 26001    | Wood made furnitures                | 77.6        | 70.6    | 7.0     | 2.1     |                      |
| 56   | 31300    | Paint                               | 77.3        | 52.6    | 24.7    | —       |                      |
| 57   | 29100    | Leather                             | 75.9        | 56.5    | 19.4    | 10.0    | (0.58)               |
| 58   | 23130    | Woolen & worsted yarn               | 75.8        | 67.9    | 7.9     | 70.0    |                      |
| 59   | 20103    | Dairy products                      | 75.5        | 75.2    | 0.3     | 27.4    |                      |
| 60   | 26002    | Metallic furnitures                 | 74.1        | 73.0    | 1.1     | 9.2     |                      |

| Rank | I-O Code | Item                                    | $t_1^{1+2}$ | $t_1^1$ | $t_1^2$ | $t_1^3$ | Share of imports (%) |
|------|----------|---|-------------|---------|---------|---------|----------------------|
| 61   | 39904    | Musical instruments                     | 73.4        | 55.1    | 18.3    | 1.4     |                      |
| 62   | 20999    | Other processed food                    | 73.2        | 49.8    | 23.4    | 16.1    |                      |
| 63   | 39211    | Optical instruments                     | 71.3        | 23.5    | 47.8    | —       |                      |
| 64   | 31929    | Other chemical products                 | 71.2        | 31.9    | 39.3    | 13.6    |                      |
| 65   | 23143    | Chemical fibre yarn                     | 69.9        | 32.8    | 37.1    | 20.1    |                      |
| 66   | 38300    | Motor vehicles                          | 69.8        | 52.6    | 17.2    | 10.0    |                      |
| 67   | 39903    | Toys & sporting goods                   | 69.2        | 56.6    | 12.6    | 22.4    |                      |
| 68   | 24901    | Finished textile products               | 69.0        | 38.7    | 30.3    | 49.4    |                      |
| 69   | 34210    | Copper                                  | 68.6        | 28.8    | 39.8    | —       | (2.80)               |
| 70   | 36051    | Office machines                         | 67.5        | 55.5    | 12.0    | —       |                      |
| 71   | 01144    | Ginseng & pyrethrum flower              | 66.8        | 19.3    | 47.5    | —       |                      |
| 72   | 37013    | Electric motor                          | 66.6        | 33.6    | 33.0    | —       |                      |
| 73   | 39701    | Watch                                   | 64.6        | 51.7    | 12.9    | —       |                      |
| 74   | 37012    | Transformer & socket                    | 64.4        | 34.3    | 30.1    | —       |                      |
| 75   | 23500    | Ropes & fishing nets                    | 64.3        | 47.9    | 16.4    | 47.9    |                      |
| 76   | 01130    | Fruits                                  | 62.5        | 51.8    | 10.7    | 4.0     |                      |
| 77   | 25900    | Other wood products                     | 62.5        | 51.2    | 11.3    | —       |                      |
| 78   | 25300    | Wood box & tub                          | 61.2        | 53.1    | 8.1     | —       |                      |
| 79   | 31910    | Pharmaceutical preparation              | 61.2        | 24.8    | 36.4    | 29.5    | (3.16)               |
| 80   | 31130    | Dyestuffs                               | 60.5        | 35.2    | 25.3    | 0.9     |                      |
| 81   | 37031    | Electric apparatus                      | 60.2        | 57.8    | 2.4     | —       |                      |
| 82   | 35023    | Miscellaneous metal products            | 59.9        | 51.4    | 8.5     | —       |                      |
| 83   | 19300    | Talc                                    | 59.2        | 25.4    | 33.8    | —       |                      |
| 84   | 39901    | Umbrella & parasol                      | 57.4        | 45.9    | 11.4    | —       |                      |
| 85   | 02120    | Charcoal & firewood                     | 57.2        | 35.5    | 21.7    | —       |                      |
| 86   | 38201    | Railroad equipment                      | 57.0        | 48.9    | 8.1     | —       |                      |
| 87   | 90210    | Plastic material & artificial resins    | 56.6        | 30.1    | 26.5    | 34.1    |                      |
| 88   | 01122    | Miscellaneous cereals                   | 55.0        | 44.0    | 11.0    | —       |                      |
| 89   | 20995    | Combined feed                           | 54.9        | 21.2    | 33.7    | —       | (16.73)              |
| 90   | 23110    | Cotton yarn                             | 53.3        | 50.2    | 3.1     | 9.9     |                      |
| 91   | 30001    | Rubber products                         | 52.7        | 48.2    | 4.5     | 2.1     |                      |
| 92   | 04110    | Fishery                                 | 51.5        | 46.8    | 4.7     | —       |                      |
| 93   | 39906    | Stationery                              | 50.6        | 44.1    | 6.5     | 3.4     |                      |
| 94   | 39902    | Bristle                                 | 49.6        | 38.6    | 11.0    | —       |                      |
| 95   | 90209    | Chemicals (div. 51, 52, 53, 54, 55, 59) | 49.6        | 19.9    | 29.7    | 5.7     |                      |
| 96   | 90211    | Rubber manufactures (div. 62)           | 48.9        | 35.5    | 13.4    | 32.9    |                      |
| 97   | 01145    | Appreciation plant                      | 48.3        | 40.3    | 8.0     | —       |                      |
| 98   | 33500    | Cement products                         | 47.2        | 47.2    | —       | 6.3     |                      |
| 99   | 90218    | Miscellaneous manufactured articles     | 47.2        | 28.6    | 18.6    | 2.3     | (10.34)              |
| 100  | 28001    | Newspaper                               | 45.6        | 39.3    | 6.3     | —       |                      |
| 101  | 90213    | Textile yarn & fabrics (div. 65)        | 45.4        | 28.9    | 16.5    | 17.9    |                      |
| 102  | 27120    | Newsprint, woodfree & kraft             | 45.1        | 32.5    | 12.6    | 4.4     |                      |
| 103  | 36070    | Machine parts                           | 44.9        | 29.1    | 15.8    | —       |                      |
| 104  | 31141    | Explosives                              | 44.5        | 44.2    | 0.3     | 12.0    |                      |
| 105  | 90201    | Food (div. 02, 05, 06, 07)              | 43.0        | 32.8    | 10.2    | 13.6    |                      |
| 106  | 20320    | Wheat flour                             | 42.3        | 42.3    | —       | —       |                      |
| 107  | 01149    | Miscellaneous special crops             | 42.2        | 30.1    | 12.1    | —       |                      |
| 108  | 31121    | Basic organic chemicals                 | 41.8        | 37.2    | 4.6     | 1.4     |                      |
| 109  | 90207    | Coal & petroleum products (div. 32-34)  | 41.0        | 15.1    | 25.9    | —       | (10.34)              |
| 110  | 31191    | Inorganic chemicals                     | 39.8        | 19.3    | 20.5    | 8.6     |                      |
| 111  | 33220    | Glass products                          | 39.6        | 36.5    | 3.1     | 3.2     |                      |
| 112  | 37014    | Other industrial electric machinery     | 37.8        | 34.5    | 3.3     | —       |                      |
| 113  | 31192    | Oxygen, acetylene & dry ice             | 37.5        | 32.3    | 5.2     | 10.0    |                      |
| 114  | 35022    | Tools                                   | 37.2        | 35.8    | 2.4     | —       |                      |
| 115  | 34151    | Forged steel                            | 37.1        | 21.7    | 15.4    | —       |                      |
| 116  | 36031    | Farming machines                        | 36.5        | 34.9    | 1.6     | —       |                      |
| 117  | 90205    | Textile fibres (div. 26)                | 36.2        | 22.8    | 13.4    | 11.8    |                      |
| 118  | 33992    | Asbestos products                       | 35.8        | 35.8    | —       | —       |                      |
| 119  | 34160    | Galvanized steel pipe                   | 35.4        | 25.4    | 10.0    | 4.0     | (10.34)              |
| 120  | 02111    | Forest                                  | 34.1        | 10.2    | 23.9    | —       |                      |
| 121  | 39112    | Measuring instruments                   | 33.8        | 33.1    | 0.7     | —       |                      |
| 122  | 23222    | Staple fibre fabrics                    | 32.8        | 31.7    | 1.1     | 40.0    |                      |
| 123  | 39121    | Medical instruments                     | 31.5        | 23.6    | 7.9     | —       |                      |
| 124  | 31921    | Soap                                    | 31.2        | 31.2    | —       | 8.6     |                      |
| 125  | 31115    | Soda products                           | 31.0        | 20.3    | 10.7    | 8.8     |                      |

| Rank | I-O Code | Item   | $t_1^{1+2}$ | $t_1^1$ | $t_1^2$ | $t_1^3$ | Share of imports (%) |
|------|----------|--|-------------|---------|---------|---------|----------------------|
| 126  | 36061    | Sewing machines                              | 30.6        | 23.4    | 7.2     | 2.4     | }                    |
| 127  | 90266    | Non-metallic mineral manufacture             | 30.4        | 13.9    | 16.5    | 0.2     |                      |
| 128  | 33999    | Other clay & stone products                  | 29.3        | 27.9    | 1.4     | —       | }                    |
| 129  | 34250    | Non-ferrous metallic cast products           | 28.9        | 25.7    | 3.2     | —       |                      |
| 130  | 34131    | Steel pipes                                  | 28.6        | 25.4    | 3.2     | —       |                      |
| 131  | 31202    | Hats   | 28.3        | 26.9    | 1.4     | —       |                      |
| 132  | 15000    | Raw salt                                     | 28.2        | 27.7    | 0.5     | —       |                      |
| 133  | 36034    | Special industrial machine                   | 28.0        | 26.8    | 1.2     | —       |                      |
| 134  | 90214    | Iron & steel (div. 67)                       | 28.0        | 24.0    | 4.0     | —       |                      |
| 135  | 20101    | Slaughtering                                 | 27.8        | 23.7    | 4.1     | —       |                      |
| 136  | 32300    | Petroleum products                           | 27.2        | 25.1    | 2.1     | 47.2    |                      |
| 137  | 90216    | Manufactures of metal (div. 69)              | 27.0        | 25.0    | 2.0     | —       |                      |
| 138  | 14000    | Sand & stone                                 | 26.8        | —       | 26.8    | —       | (14.81)              |
| 139  | 34112    | Crude steel                                  | 26.7        | 9.7     | 17.0    | —       |                      |
| 140  | 34230    | Non-ferrous metallic rolled products         | 26.7        | 23.4    | 3.3     | 3.5     |                      |
| 141  | 33930    | Polishing stone & paper                      | 25.8        | 23.4    | 2.4     | —       |                      |
| 142  | 38130    | Wooden ship building & repairing             | 25.1        | 25.1    | —       | —       |                      |
| 143  | 90217    | Machinery & transport equipment (div. 71-73) | 25.1        | 20.7    | 4.4     | 1.0     |                      |
| 144  | 36033    | Textile machines                             | 24.4        | 20.7    | 3.7     | —       |                      |
| 145  | 01152    | Hen, duck, turkey & geese                    | 23.5        | 21.4    | 2.1     | —       |                      |
| 146  | 01124    | Vegetables                                   | 22.7        | 15.1    | 7.6     | —       |                      |
| 147  | 39909    | Miscellaneous manufacturing                  | 22.6        | 20.6    | 2.0     | —       |                      |
| 148  | 38120    | Steelship building & repairing               | 22.0        | 20.7    | 1.3     | —       | (39.8)               |
| 149  | 90208    | Animal & vegetable oils & fat                | 22.0        | 20.5    | 1.5     | —       |                      |
| 150  | 34120    | Rolled steel                                 | 21.5        | 19.8    | 1.7     | —       |                      |
| 151  | 33102    | Fire clay products                           | 21.3        | 21.0    | 0.3     | —       |                      |
| 152  | 37034    | Watt-meter                                   | 20.3        | 14.9    | 5.4     | —       |                      |
| 153  | 20500    | Sugars                                       | 20.1        | 20.1    | —       | 39.8    |                      |
| 154  | 32900    | Coal products                                | 19.9        | 19.7    | 0.2     | —       | (49.32)              |
| 155  | 02112    | Forest products                              | 19.1        | 13.0    | 6.1     | —       |                      |
| 156  | 90215    | Non-ferrous metal                            | 19.1        | 14.2    | 4.9     | 6.0     |                      |
| 157  | 39122    | Sanitary materials                           | 18.7        | —       | 18.7    | —       |                      |
| 158  | 25400    | Bamboo & cork products                       | 16.7        | 4.2     | 12.5    | —       |                      |
| 159  | 31924    | Pesticide                                    | 16.7        | 15.0    | 1.7     | —       |                      |
| 160  | 90202    | Crude rubber (div. 23)                       | 16.6        | 11.0    | 5.6     | 23.8    |                      |
| 161  | 01142    | Perilla frutescens & castor beans            | 15.9        | 15.9    | —       | —       |                      |
| 162  | 19900    | Miscellaneous non-metallic minerals          | 15.4        | 15.1    | 0.1     | —       |                      |
| 163  | 31114    | Calcium carbide                              | 14.8        | 14.8    | —       | —       |                      |
| 164  | 01111    | Rice   | 14.7        | 14.7    | —       | —       | (1.09)               |
| 165  | 33400    | Cement                                       | 14.6        | 14.6    | —       | 5.0     |                      |
| 166  | 01153    | Pig  | 14.4        | 9.7     | 4.7     | —       |                      |
| 167  | 88002    | Other scrap                                  | 13.3        | 11.5    | 1.8     | 5.9     |                      |
| 168  | 23230    | Woolen & worsted fabrics                     | 12.6        | 10.6    | 2.0     | —       |                      |
| 169  | 01141    | Cotton & hemp                                | 10.6        | 10.4    | 0.2     | 0.5     |                      |
| 170  | 01151    | Dairy cattle                                 | 10.3        | 10.3    | —       | —       |                      |
| 171  | 90203    | Wood, lumber & cork (div. 24)                | 10.3        | 9.8     | 0.5     | —       |                      |
| 172  | 01112    | Barley & wheat                               | 10.2        | 10.2    | —       | —       |                      |
| 173  | 11100    | Anthracite                                   | 10.2        | 10.2    | —       | —       |                      |
| 174  | 32210    | Briquet                                      | 10.2        | 10.2    | —       | —       | (1.09)               |
| 175  | 34111    | Pig iron                                     | 10.2        | 10.2    | —       | —       |                      |
| 176  | 90204    | Pulp   | 10.1        | 10.0    | 0.1     | —       |                      |
| 177  | 01159    | Other livestock & poultry                    | 10.0        | 10.0    | —       | —       |                      |
| 178  | 25100    | Saw mills                                    | 9.8         | 9.8     | —       | —       |                      |
| 179  | 38110    | Ship motor                                   | 9.6         | 9.6     | —       | —       |                      |
| 180  | 88001    | Metal scrap                                  | 6.2         | 6.1     | 0.1     | 6.2     |                      |
| 181  | 36032    | Mining & construction machines               | 5.0         | 5.0     | —       | —       |                      |
| 182  | 36021    | Working machine                              | 4.8         | 4.8     | —       | —       |                      |
| 183  | 31181    | Chemical fertilizer                          | 1.5         | 0.7     | 0.8     | —       |                      |
| 184  | 01123    | Potatoes                                     | —           | —       | —       | —       | (1.09)               |
| 185  | 01170    | Cocoon                                       | —           | —       | —       | —       |                      |
| 186  | 04120    | Laver & oyster                               | —           | —       | —       | —       |                      |
| 187  | 11200    | Peat & sub-bituminous coal                   | —           | —       | —       | —       |                      |
| 188  | 12100    | Iron ore                                     | —           | —       | —       | —       |                      |
| 189  | 12210    | Tungsten ore                                 | —           | —       | —       | —       |                      |



| Rank | I-O Code | Item                                | t <sub>1</sub> <sup>1+2</sup> | t <sub>1</sub> <sup>1</sup> | t <sub>1</sub> <sup>2</sup> | t <sub>1</sub> <sup>3</sup> | Share of imports (%) |
|------|----------|-------------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------|
| 190  | 12220    | Manganese ore                       | —                             | —                           | —                           | —                           |                      |
| 191  | 12230    | Gold & silver ore                   | —                             | —                           | —                           | —                           |                      |
| 192  | 12240    | Copper ore                          | —                             | —                           | —                           | —                           |                      |
| 193  | 12250    | Lead ore                            | —                             | —                           | —                           | —                           |                      |
| 194  | 12260    | Zinc ore                            | —                             | —                           | —                           | —                           |                      |
| 195  | 12290    | Miscellaneous metallic ore          | —                             | —                           | —                           | —                           |                      |
| 196  | 13000    | Rare element ore                    | —                             | —                           | —                           | —                           |                      |
| 197  | 19100    | Graphite                            | —                             | —                           | —                           | —                           |                      |
| 198  | 19200    | Kaolin                              | —                             | —                           | —                           | —                           |                      |
| 199  | 19400    | Fluorspar                           | —                             | —                           | —                           | —                           |                      |
| 200  | 19500    | Lime stone                          | —                             | —                           | —                           | —                           |                      |
| 201  | 20211    | Canned fruits & vegetables          | —                             | —                           | —                           | —                           |                      |
| 202  | 20221    | Canned sea food                     | —                             | —                           | —                           | —                           |                      |
| 203  | 20310    | Grain milling                       | —                             | —                           | —                           | —                           |                      |
| 204  | 20800    | Ice                                 | —                             | —                           | —                           | —                           |                      |
| 205  | 20930    | Bean curd                           | —                             | —                           | —                           | —                           |                      |
| 206  | 20940    | Bean sprout                         | —                             | —                           | —                           | —                           |                      |
| 207  | 20991    | Maltose                             | —                             | —                           | —                           | —                           |                      |
| 208  | 20992    | Edible salt                         | —                             | —                           | —                           | —                           |                      |
| 209  | 20993    | Edible vegetable oils               | —                             | —                           | —                           | —                           |                      |
| 210  | 21103    | Distilled spirits                   | —                             | —                           | —                           | 4.5                         | (0.00)               |
| 211  | 21300    | Clean & unrefined rice wine         | —                             | —                           | —                           | 6.8                         |                      |
| 212  | 21400    | Sake                                | —                             | —                           | —                           | 27.8                        |                      |
| 213  | 23141    | Hemp & flax yarn                    | —                             | —                           | —                           | 10.0                        |                      |
| 214  | 23142    | Staple fibre yarn                   | —                             | —                           | —                           | 10.0                        |                      |
| 215  | 23910    | Straw seats                         | —                             | —                           | —                           | —                           |                      |
| 216  | 23920    | Straw bags & rope                   | —                             | —                           | —                           | —                           |                      |
| 217  | 23991    | Cotton                              | —                             | —                           | —                           | —                           |                      |
| 218  | 27170    | Window paper                        | —                             | —                           | —                           | —                           |                      |
| 219  | 27180    | Asphalt roofing & water proof paper | —                             | —                           | —                           | —                           |                      |
| 220  | 30002    | Rubber shoes                        | —                             | —                           | —                           | —                           |                      |
| 221  | 31111    | Ammonia                             | —                             | —                           | —                           | —                           |                      |
| 222  | 31112    | Sulfuric acid                       | —                             | —                           | —                           | —                           |                      |
| 223  | 31189    | Other fertilizer                    | —                             | —                           | —                           | —                           |                      |
| 224  | 31992    | Toilet articles                     | —                             | —                           | —                           | —                           |                      |
| 225  | 33991    | Carbon products                     | —                             | —                           | —                           | —                           |                      |
| 226  | 34132    | Cast steel                          | —                             | —                           | —                           | —                           |                      |
| 227  | 34133    | Cast iron pipe                      | —                             | —                           | —                           | —                           |                      |
| 228  | 34229    | Other non-ferrous metals            | —                             | —                           | —                           | —                           |                      |
| 229  | 35011    | Gate                                | —                             | —                           | —                           | —                           |                      |
| 230  | 36022    | Processing machines                 | —                             | —                           | —                           | —                           |                      |
| 231  | 36041    | General purpose industrial machine  | —                             | —                           | —                           | —                           |                      |
| 232  | 37011    | Generator                           | —                             | —                           | —                           | —                           |                      |
| 233  | 37033    | Machine for post & telegraph        | —                             | —                           | —                           | —                           |                      |
| 234  | 38400    | Motor vehicle repairing             | —                             | —                           | —                           | —                           |                      |
| 235  | 38901    | Other transport equipment           | —                             | —                           | —                           | —                           |                      |
| 236  | 39111    | Scientific instruments              | —                             | —                           | —                           | —                           |                      |
| 237  | 39300    | Precious metals & jewels            | —                             | —                           | —                           | 10.0                        |                      |
| 238  | 39905    | Synthetic resin products            | —                             | —                           | —                           | —                           |                      |

Table X.  $t_i^1$  Rankings

| Rank | I-O Code | Item                                | $t_i^1$ | Share of import (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 1    | 35012    | Structural metal products           | 437.6   | (0.43)              |
| 2    | 01143    | Tobacco & peppermint                | 249.7   |                     |
| 3    | 22000    | Cigarette                           | 240.4   |                     |
| 4    | 24300    | Wearing apparel & accessories       | 208.9   |                     |
| 5    | 36011    | Prime mover & boiler                | 196.9   | (0.10)              |
| 6    | 21901    | Fruit wine                          | 183.1   |                     |
| 7    | 21200    | Beer                                | 182.1   |                     |
| 8    | 21909    | Miscellaneous liquors               | 177.9   |                     |
| 9    | 23210    | Cotton fabrics                      | 173.3   |                     |
| 10   | 20910    | Noodle & vermicelli                 | 102.3   | (0.01)              |
| 11   | 20600    | Sugar confectioneries               | 100.6   |                     |
| 12   | 24111    | Leather shoes                       | 99.7    |                     |
| 13   | 20400    | Bread & confectioneries             | 98.7    |                     |
| 14   | 20219    | Other processed fruits & vegetables | 98.5    | (0.13)              |
| 15   | 31925    | Matches                             | 93.6    |                     |
| 16   | 38510    | Bicycle & rear-car                  | 93.4    |                     |
| 17   | 29200    | Leather products                    | 93.3    |                     |
| 18   | 20996    | Malt                                | 90.1    |                     |
| 19   | 27160    | Manila board & plane board          | 85.4    | (0.21)              |
| 20   | 20223    | Preserved sea food                  | 85.2    |                     |
| 21   | 20994    | Tea                                 | 82.1    |                     |
| 22   | 23224    | Chemical fibre fabrics              | 81.8    |                     |
| 23   | 20102    | Canned & processed meat             | 80.5    |                     |
| 24   | 20222    | Sea food                            | 80.3    | (0.07)              |
| 25   | 39907    | Accessories                         | 80.3    |                     |
| 26   | 23221    | Silk fabrics                        | 79.2    |                     |
| 27   | 33101    | Structural clay products            | 78.7    |                     |
| 28   | 35021    | Household metallic products         | 78.7    |                     |
| 29   | 20790    | Miscellaneous seasoning             | 78.3    |                     |
| 30   | 27240    | Notebook & paper for office use     | 78.0    |                     |
| 31   | 33210    | Plate glass                         | 76.9    |                     |
| 32   | 20710    | Soy sauce & bean paste              | 75.9    |                     |
| 33   | 20103    | Dairy products                      | 75.2    |                     |
| 34   | 23240    | Hemp fabrics                        | 74.7    | (0.01)              |
| 35   | 27230    | Paper case & bag                    | 73.6    |                     |
| 36   | 26002    | Metallic furnitures                 | 73.0    |                     |
| 37   | 26001    | Wood-made furnitures                | 70.6    |                     |
| 38   | 21600    | Soft drinks                         | 70.5    | (0.01)              |
| 39   | 28009    | Other printing & publishing         | 68.0    |                     |
| 40   | 23130    | Woolen & worsted yarn               | 67.9    |                     |
| 41   | 01121    | Pulses                              | 63.5    |                     |
| 42   | 23120    | Raw Silk                            | 62.4    |                     |
| 43   | 39500    | Lacquerware                         | 62.4    | (0.46)              |
| 44   | 23999    | Miscellaneous textile products      | 61.2    |                     |
| 45   | 31923    | Printing ink                        | 58.9    |                     |
| 46   | 37031    | Electric apparatus                  | 57.8    |                     |
| 47   | 39903    | Toys & sporting goods               | 56.6    |                     |
| 48   | 29100    | Leather                             | 56.5    |                     |
| 49   | 25900    | Other wood products                 | 56.2    |                     |
| 50   | 36051    | Office machines                     | 55.5    |                     |
| 51   | 39904    | Musical instruments                 | 55.1    |                     |
| 52   | 39212    | Photographic materials              | 55.0    |                     |
| 53   | 21101    | Alcohol                             | 54.6    | (0.46)              |
| 54   | 25300    | Wool box & tub                      | 53.1    |                     |
| 55   | 31300    | Paint                               | 52.6    |                     |
| 56   | 38300    | Motor vehicles                      | 52.6    |                     |
| 57   | 01130    | Fruits                              | 51.8    | (0.46)              |
| 58   | 39701    | Watch                               | 51.7    |                     |
| 59   | 25200    | Plywood                             | 51.6    |                     |

| Rank | I-O Code | Item  | t <sub>1</sub> <sup>1</sup> | Share of import (%) |
|------|----------|---|-----------------------------|---------------------|
| 60   | 35023    | Miscellaneous metal products                      | 51.4                        |                     |
| 61   | 27210    | Wall, floor & window paper                        | 50.8                        |                     |
| 62   | 23110    | Cotton yarn                                       | 50.2                        |                     |
| 63   | 20999    | Other processed food                              | 49.8                        | (0.29)              |
| 64   | 38201    | Railroad equipment                                | 48.9                        |                     |
| 65   | 30001    | Rubber products                                   | 48.2                        |                     |
| 66   | 33300    | Pottery   | 48.0                        |                     |
| 67   | 23500    | Ropes & fishing nets                              | 47.9                        |                     |
| 68   | 33500    | Cement products                                   | 47.2                        |                     |
| 69   | 04110    | Fishery   | 46.8                        |                     |
| 70   | 37021    | Electric bulb and fluorescent tube                | 46.1                        |                     |
| 71   | 39901    | Umbrella & parasol                                | 45.9                        |                     |
| 72   | 01122    | Miscellaneous cereals                             | 44.0                        |                     |
| 73   | 31141    | Explosives  | 44.2                        |                     |
| 74   | 39906    | Stationery  | 44.1                        |                     |
| 75   | 31201    | Oils  | 42.6                        |                     |
| 76   | 20320    | Wheat & flour                                     | 42.3                        |                     |
| 77   | 20920    | Starch  | 40.6                        |                     |
| 78   | 01145    | Appreciation plant                                | 40.3                        |                     |
| 79   | 28001    | Newspaper   | 39.3                        | (9.05)              |
| 80   | 24901    | Finished textile products                         | 38.7                        |                     |
| 81   | 39902    | Bristle   | 38.6                        |                     |
| 82   | 90212    | Paper & manufactures there of                     | 38.1                        |                     |
| 83   | 31121    | Basic organic chemicals                           | 37.2                        |                     |
| 84   | 37035    | Electric copper wire & cable                      | 36.6                        |                     |
| 85   | 33220    | Glass products                                    | 36.5                        |                     |
| 86   | 33992    | Asbestos products                                 | 35.8                        |                     |
| 87   | 35022    | Tool  | 35.8                        |                     |
| 88   | 02120    | Charcoal firewood                                 | 35.5                        |                     |
| 89   | 90211    | Rubber manufactures                               | 35.5                        |                     |
| 90   | 31130    | Dyestuffs   | 35.2                        |                     |
| 91   | 36031    | Farming machines                                  | 34.9                        |                     |
| 92   | 37014    | Other industrial electric machinery and equipment | 34.5                        |                     |
| 93   | 37012    | Transformer & socket                              | 34.3                        |                     |
| 94   | 37013    | Electric motor                                    | 33.6                        |                     |
| 95   | 39112    | Measuring instrument                              | 33.1                        |                     |
| 96   | 23143    | Chemical fibre yarn                               | 32.8                        |                     |
| 97   | 90201    | Food (Div. 0.2, 0.5, 0.6, 0.7 of SITC)            | 32.8                        |                     |
| 98   | 27120    | Newsprint, woodfree & kraft paper                 | 32.5                        |                     |
| 99   | 31192    | Oxygen, acetylene & dry ice                       | 32.3                        | (24.91)             |
| 100  | 31929    | Other chemical products                           | 31.9                        |                     |
| 101  | 23222    | Staple fibre fabrics                              | 31.7                        |                     |
| 102  | 31921    | Soap  | 31.2                        |                     |
| 103  | 37022    | Household electric appliance                      | 31.1                        |                     |
| 104  | 01149    | Miscellaneous special crops                       | 30.1                        |                     |
| 105  | 31113    | Hydrochloric acid                                 | 30.1                        |                     |
| 106  | 90210    | Plastic materials & Artificial Resin              | 30.1                        |                     |
| 107  | 36070    | Machine parts                                     | 29.1                        |                     |
| 108  | 90213    | Textile & fibres                                  | 28.9                        |                     |
| 109  | 34210    | Copper  | 28.8                        |                     |
| 110  | 90218    | Miscellaneous manufactured articles               | 28.6                        |                     |
| 111  | 33999    | Other clay & stone products                       | 27.9                        |                     |
| 112  | 15000    | Raw salt  | 27.7                        |                     |
| 113  | 31202    | Hats  | 26.9                        |                     |
| 114  | 36034    | Special industry machine                          | 26.8                        |                     |
| 115  | 34250    | Nonferrous metallic cast products                 | 25.7                        |                     |
| 116  | 19300    | Talc  | 25.4                        | (24.91)             |
| 117  | 34131    | Steel pipes                                       | 25.4                        |                     |
| 118  | 34160    | Galvanized steel pipe                             | 25.4                        |                     |
| 119  | 32300    | Petroleum products                                | 25.1                        |                     |
| 120  | 38130    | Wooden shipbuilding & repairing                   | 25.1                        |                     |
| 121  | 90216    | Manufactures of metal                             | 25.0                        |                     |
| 122  | 31910    | Pharmaceutical preparation                        | 24.8                        |                     |
| 123  | 90214    | Iron & Steel (Div. 67)                            | 24.0                        |                     |
| 124  | 20101    | Slaughtering                                      | 23.7                        |                     |

| Rank | I-O Code | Item                                | $t_i^1$ | Share of import (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 125  | 39121    | Medical instrument                  | 23.6    | }                   |
| 126  | 39211    | Optical instrument                  | 23.5    |                     |
| 127  | 33930    | Polishing stone & paper             | 23.4    |                     |
| 128  | 34230    | Nonferrous metallic rolled products | 23.4    |                     |
| 129  | 36061    | Sewing machines                     | 23.4    |                     |
| 130  | 90205    | Textile fibre (Div. 26)             | 22.8    |                     |
| 131  | 34151    | Forged steel                        | 21.7    |                     |
| 132  | 01152    | Hen, duck, turkey & geese           | 21.4    |                     |
| 133  | 20995    | Combined feed                       | 21.2    |                     |
| 134  | 33102    | Fire clay products                  | 21.0    |                     |
| 135  | 36033    | Textile machines                    | 20.7    |                     |
| 136  | 38120    | Steel shipbuilding and repairing    | 20.7    |                     |
| 137  | 90217    | Machinery & transport equipments    | 20.7    |                     |
| 138  | 39909    | Miscellaneous manufacturing         | 20.6    |                     |
| 139  | 90208    | Animal vegetable oils & fats        | 20.5    |                     |
| 140  | 31115    | Soda products                       | 20.3    |                     |
| 141  | 20500    | Sugars                              | 20.1    |                     |
| 142  | 90209    | Chemicals (Div. 51~55, 59)          | 19.9    | }                   |
| 143  | 34120    | Rolled steel                        | 19.8    |                     |
| 144  | 32900    | Coal products                       | 19.7    |                     |
| 145  | 01144    | Ginseng & pyrethrum flower          | 19.3    |                     |
| 146  | 31191    | Inorganic chemicals                 | 19.3    |                     |
| 147  | 23400    | Knitting mill products              | 16.4    |                     |
| 148  | 01142    | Perilla frutescens & castor beans   | 15.9    |                     |
| 149  | 01124    | Vegetables                          | 15.1    |                     |
| 150  | 19900    | Miscellaneous non-metallic minerals | 15.1    |                     |
| 151  | 90207    | Coal & petroleum products           | 15.1    |                     |
| 152  | 31924    | Pesticide                           | 15.0    |                     |
| 153  | 37034    | Watt-meter                          | 14.9    |                     |
| 154  | 31114    | Calcium carbide                     | 14.8    |                     |
| 155  | 01111    | Rice                                | 14.7    |                     |
| 156  | 33400    | Cement                              | 14.6    |                     |
| 157  | 90215    | Nonferrous metals                   | 14.2    |                     |
| 158  | 90206    | Non-metallic mineral manufactures   | 13.9    |                     |
| 159  | 02112    | Forest products                     | 13.0    |                     |
| 160  | 88002    | Other scrap                         | 11.5    |                     |
| 161  | 90202    | Crude rubber                        | 11.0    |                     |
| 162  | 23230    | Woolen & worsted fabrics            | 10.6    | }                   |
| 163  | 01141    | Cotton & hemp                       | 10.4    |                     |
| 164  | 01151    | Dairy cattle                        | 10.3    |                     |
| 165  | 01112    | Barley & wheat                      | 10.2    |                     |
| 166  | 02111    | Forest                              | 10.2    |                     |
| 167  | 11100    | Anthracite                          | 10.2    |                     |
| 168  | 32210    | Briquet                             | 10.2    |                     |
| 169  | 34111    | Pig iron                            | 10.2    |                     |
| 170  | 01159    | Other livestock & poultry           | 10.0    |                     |
| 171  | 90204    | Pulp                                | 10.0    |                     |
| 172  | 25100    | Saw mills                           | 9.8     |                     |
| 173  | 90203    | Wood, lumber & cork                 | 9.8     |                     |
| 174  | 01153    | Pig                                 | 9.7     |                     |
| 175  | 34112    | Crude steel                         | 9.7     |                     |
| 176  | 38110    | Ship motor                          | 9.6     |                     |
| 177  | 88001    | Metal scrap                         | 6.1     |                     |
| 178  | 36032    | Mining & construction machines      | 5.0     |                     |
| 179  | 36021    | Working machines                    | 4.8     |                     |
| 180  | 25400    | Bamboo & cork products              | 4.2     |                     |
| 181  | 31181    | Chemical fertilizer                 | 0.7     |                     |
| 182  | 01123    | Potatoes                            | —       | }                   |
| 183  | 01170    | Cocoon                              | —       |                     |
| 184  | 04120    | Laver & oyster                      | —       |                     |
| 185  | 11200    | Peat & sub-bituminous coal          | —       |                     |
| 186  | 12100    | Iron ores                           | —       |                     |
| 187  | 12210    | Tungsten ores                       | —       |                     |
| 188  | 12220    | Manganese ores                      | —       |                     |
| 189  | 12230    | Gold & silver ores                  | —       |                     |

(56.39)

(7.94)

| Rank | I-O Code | Item   | t <sub>i</sub> <sup>1</sup> | Share of<br>import (%) |
|------|----------|--|-----------------------------|------------------------|
| 190  | 12240    | Copper ores                                      | —                           | (0.00)                 |
| 191  | 12250    | Lead ores  | —                           |                        |
| 192  | 12260    | Zinc ores  | —                           |                        |
| 193  | 12290    | Miscellaneous metallic ores                      | —                           |                        |
| 194  | 13000    | Rare element ores                                | —                           |                        |
| 195  | 14000    | Sand & stone                                     | —                           |                        |
| 196  | 19100    | Graphite   | —                           |                        |
| 197  | 19200    | Kaolin   | —                           |                        |
| 198  | 19400    | Fluorspar  | —                           |                        |
| 199  | 19500    | Lime stone                                       | —                           |                        |
| 200  | 20211    | Canned fruits & vegetables                       | —                           |                        |
| 201  | 20221    | Canned sea food                                  | —                           |                        |
| 202  | 20310    | Grain milling                                    | —                           |                        |
| 203  | 20800    | Ice  | —                           |                        |
| 204  | 20930    | Bean curd  | —                           |                        |
| 205  | 20940    | Bean sprout                                      | —                           |                        |
| 206  | 20991    | Maltose  | —                           |                        |
| 207  | 20992    | Edible salt                                      | —                           |                        |
| 208  | 20993    | Edible vegetable oils                            | —                           |                        |
| 209  | 21103    | Distilled spirits                                | —                           |                        |
| 210  | 21300    | Clean & unrefined rice wine                      | —                           |                        |
| 211  | 21400    | Sake   | —                           |                        |
| 212  | 23141    | Hemp & flax yarn                                 | —                           |                        |
| 213  | 23142    | Staple fibre yarn                                | —                           |                        |
| 214  | 23910    | Straw seats                                      | —                           |                        |
| 215  | 23920    | Straw bags & rope                                | —                           |                        |
| 216  | 23991    | Cotton   | —                           |                        |
| 217  | 27170    | Window paper                                     | —                           |                        |
| 218  | 27180    | Asphalt roofing & water proof paper              | —                           |                        |
| 219  | 30002    | Rubber shoes                                     | —                           |                        |
| 220  | 31111    | Ammonia  | —                           |                        |
| 221  | 31112    | Sulfuric acid                                    | —                           |                        |
| 222  | 31189    | Other fertilizer                                 | —                           |                        |
| 223  | 31992    | Toilet articles                                  | —                           |                        |
| 224  | 33991    | Carbon products                                  | —                           |                        |
| 225  | 34229    | Other non-ferrous metals                         | —                           |                        |
| 226  | 34132    | Cast steel                                       | —                           |                        |
| 227  | 34133    | Cast iron pipe                                   | —                           |                        |
| 228  | 35011    | Gate   | —                           |                        |
| 229  | 36022    | Metal processing machines                        | —                           |                        |
| 230  | 36041    | General purpose industrial machine and equipment | —                           |                        |
| 231  | 37011    | Generator  | —                           |                        |
| 232  | 37033    | Machine for post and telegraph                   | —                           |                        |
| 233  | 38400    | Motor vehicle repairing                          | —                           |                        |
| 234  | 38901    | Other transport equipment                        | —                           |                        |
| 235  | 39111    | Scientific instrument                            | —                           |                        |
| 236  | 39122    | Sanitary materials                               | —                           |                        |
| 237  | 39300    | Precious metals & jewels                         | —                           |                        |
| 238  | 39905    | Synthetic resin products                         | —                           |                        |

Table XI.  $t_1^2$  Rankings

| Rank | I-O Code | Item                                   | $t_1^2$ | Share of import (%) |
|------|----------|--|---------|---------------------|
| 1    | 23400    | Knitting mill products                 | 292.6   | (0.19)              |
| 2    | 27230    | Paper case & bag                       | 138.8   |                     |
| 3    | 20222    | Sea food                               | 107.0   |                     |
| 4    | 21101    | Alcohol                                | 86.8    | (0.00)              |
| 5    | 31113    | Hydrochloric acid                      | 85.6    |                     |
| 6    | 20920    | Starch                                 | 66.1    | (0.00)              |
| 7    | 01143    | Tobacco & peppermint                   | 62.4    |                     |
| 8    | 33101    | Structural clay products               | 57.4    |                     |
| 9    | 37022    | Household electric appliance           | 52.7    | (0.11)              |
| 10   | 21600    | Soft drinks                            | 52.0    |                     |
| 11   | 90212    | Paper & manufactures thereof           | 50.3    |                     |
| 12   | 25200    | Plywood                                | 48.3    | (0.24)              |
| 13   | 39211    | Optical instrument                     | 47.8    |                     |
| 14   | 01144    | Ginseng & Pyrethrum flower             | 47.5    |                     |
| 15   | 27240    | Notebook & paper for office use        | 46.2    |                     |
| 16   | 33300    | Pottery                                | 44.3    |                     |
| 17   | 20600    | Sugar confectioneries                  | 43.4    |                     |
| 18   | 37035    | Electric copper wire and cable         | 43.0    |                     |
| 19   | 31201    | Oils                                   | 42.9    |                     |
| 20   | 34210    | Copper                                 | 39.8    | (2.57)              |
| 21   | 31929    | Other chemical products                | 39.3    |                     |
| 22   | 23143    | Chemical fibre yarn                    | 37.1    |                     |
| 23   | 31910    | Pharmaceutical preparation             | 36.4    |                     |
| 24   | 37021    | Electric bulb and fluorescent tube     | 34.9    |                     |
| 25   | 19300    | Talc                                   | 33.8    |                     |
| 26   | 20995    | Combined feed                          | 33.7    |                     |
| 27   | 37013    | Electric motor                         | 33.0    |                     |
| 28   | 31923    | Printing ink                           | 32.1    |                     |
| 29   | 24901    | Finished textile products              | 30.3    |                     |
| 30   | 37012    | Transformer and socket                 | 30.1    |                     |
| 31   | 23999    | Miscellaneous textile products         | 29.9    | (14.50)             |
| 32   | 90209    | Chemicals (Div. 51-55, 59 of SITC)     | 29.7    |                     |
| 33   | 01121    | Pulses                                 | 29.1    |                     |
| 34   | 33210    | Plate glass                            | 28.6    |                     |
| 35   | 38510    | Bicycle & rear-car                     | 28.6    |                     |
| 36   | 27210    | Wall, floor & window paper             | 27.3    |                     |
| 37   | 14000    | Sand & stone                           | 26.8    |                     |
| 38   | 90210    | Plastic materials & artificial resin   | 26.5    |                     |
| 39   | 90207    | Coal & petroleum products (Div. 32-34) | 25.9    |                     |
| 40   | 39212    | Photographic materials                 | 25.8    |                     |
| 41   | 31130    | Dye stuffs                             | 25.3    | (14.50)             |
| 42   | 31300    | Paint                                  | 24.7    |                     |
| 43   | 02111    | Forest                                 | 23.9    |                     |
| 44   | 20999    | Other processed food                   | 23.4    |                     |
| 45   | 02120    | Charcoal & firewood                    | 21.7    |                     |
| 46   | 39907    | Accessories                            | 20.7    |                     |
| 47   | 31191    | Inorganic chemicals                    | 20.5    |                     |
| 48   | 29100    | Leather                                | 19.4    |                     |
| 49   | 31925    | Matches                                | 18.7    |                     |
| 50   | 39122    | Sanitary materials                     | 18.7    |                     |
| 51   | 90218    | Miscellaneous manufactured articles    | 18.6    | (14.50)             |
| 52   | 39904    | Musical instruments                    | 18.3    |                     |
| 53   | 38300    | Motor vehicles                         | 17.2    | (14.50)             |
| 54   | 34112    | Crude steel                            | 17.0    |                     |
| 55   | 20996    | Malt                                   | 16.8    |                     |
| 56   | 90206    | Non-metallic mineral manufactures      | 16.5    |                     |
| 57   | 90213    | Textile yarn & fabrics                 | 16.5    |                     |
| 58   | 23500    | Ropes & fishing nets                   | 16.4    |                     |

| Rank | I-O Code | Item  | t <sub>1</sub> <sup>2</sup> | Share of import (%) |
|------|----------|---|-----------------------------|---------------------|
| 59   | 36070    | Machine parts                                   | 15.8                        | (14.66)             |
| 60   | 39500    | Lacquerware                                     | 15.6                        |                     |
| 61   | 34151    | Forged steel                                    | 15.4                        |                     |
| 62   | 23120    | Raw silk  | 15.2                        |                     |
| 63   | 24111    | Leather shoes                                   | 14.6                        |                     |
| 64   | 23224    | Chemical fibre fabrics                          | 14.3                        |                     |
| 65   | 90205    | Textile fibres (Div. 26)                        | 13.4                        |                     |
| 66   | 90211    | Rubber manufactures                             | 13.4                        |                     |
| 67   | 39701    | Watch   | 12.9                        |                     |
| 68   | 27120    | Newsprint, woodfree & kraft paper               | 12.6                        |                     |
| 69   | 39903    | Toys & sporting goods                           | 12.6                        |                     |
| 70   | 25400    | Bamboo & cork products                          | 12.5                        |                     |
| 71   | 01149    | Miscellaneous special crops                     | 12.1                        |                     |
| 72   | 29200    | Leather products                                | 12.1                        |                     |
| 73   | 36051    | Office machines                                 | 12.0                        |                     |
| 74   | 39901    | Umbrella & parasol                              | 11.4                        |                     |
| 75   | 25900    | Other wood products                             | 11.3                        |                     |
| 76   | 01122    | Miscellaneous cereals                           | 11.0                        |                     |
| 77   | 39902    | Bristle   | 11.0                        |                     |
| 78   | 01130    | Fruits  | 10.7                        |                     |
| 79   | 31115    | Soda products                                   | 10.7                        |                     |
| 80   | 28009    | Other printing & publishing                     | 10.4                        |                     |
| 81   | 90201    | Food (Div. 02, 05, 06, 07)                      | 10.2                        |                     |
| 82   | 34160    | Galvanized steel pipe                           | 10.0                        | (52.39)             |
| 83   | 35023    | Miscellaneous metal products                    | 8.5                         |                     |
| 84   | 25300    | Wood box & tub                                  | 8.1                         |                     |
| 85   | 27160    | Manila board & plane board                      | 8.1                         |                     |
| 86   | 38201    | Railroad equipment                              | 8.1                         |                     |
| 87   | 01145    | Appreciation plant                              | 8.0                         |                     |
| 88   | 23130    | Woolen & worsted yarn                           | 7.9                         |                     |
| 89   | 39121    | Medical instrument                              | 7.9                         |                     |
| 90   | 01124    | Vegetables                                      | 7.6                         |                     |
| 91   | 36061    | Sewing machines                                 | 7.2                         |                     |
| 92   | 26001    | Wood-made furnitures                            | 7.0                         |                     |
| 93   | 35021    | Household metallic products                     | 7.0                         |                     |
| 94   | 35012    | Structural metal products                       | 6.8                         |                     |
| 95   | 39906    | Stationery                                      | 6.5                         |                     |
| 96   | 28001    | Newspaper                                       | 6.3                         |                     |
| 97   | 02112    | Forest products                                 | 6.1                         |                     |
| 98   | 90202    | Crude rubber                                    | 5.6                         |                     |
| 99   | 37034    | Watt-meter                                      | 5.4                         |                     |
| 100  | 31192    | Oxygen, acetylene & dry ice                     | 5.2                         |                     |
| 101  | 90215    | Nonferrous metals                               | 4.9                         |                     |
| 102  | 24300    | Wearing apparel & accessories                   | 4.8                         |                     |
| 103  | 01153    | Pig   | 4.7                         |                     |
| 104  | 04110    | Fishery   | 4.7                         |                     |
| 105  | 23240    | Hemp fabrics                                    | 4.6                         |                     |
| 106  | 31121    | Basic organic chemicals                         | 4.6                         |                     |
| 107  | 30001    | Rubber products                                 | 4.5                         |                     |
| 108  | 90217    | Machinery & transport equipments                | 4.4                         |                     |
| 109  | 20710    | Soy sauce & bean paste                          | 4.3                         |                     |
| 110  | 20101    | Slaughtering                                    | 4.1                         |                     |
| 111  | 90214    | Iron & Steel                                    | 4.0                         |                     |
| 112  | 36033    | Textile machines                                | 3.7                         |                     |
| 113  | 34230    | Non-ferrous metallic rolled products            | 3.3                         |                     |
| 114  | 37014    | Other industrial electric machinery & equipment | 3.3                         |                     |
| 115  | 34131    | Steel pipes                                     | 3.2                         |                     |
| 116  | 34250    | Nonferrous metallic cast products               | 3.2                         |                     |
| 117  | 23110    | Cotton yarn                                     | 3.1                         |                     |
| 118  | 33220    | Glass products                                  | 3.1                         |                     |
| 119  | 20102    | Canned & processed meat                         | 2.9                         |                     |
| 120  | 20400    | Bread & confectioneries                         | 2.9                         |                     |
| 121  | 33930    | Polishing stone & paper                         | 2.4                         |                     |
| 122  | 37031    | Electric apparatus                              | 2.4                         |                     |
| 123  | 01152    | Hen, duck, turkey & geese                       | 2.1                         |                     |
| 124  | 32300    | Petroleum products                              | 2.1                         |                     |

| Rank | I-O Code | Item                                | $\frac{I_2}{I_1}$ | Share of import (%) |
|------|----------|-------------------------------------|-------------------|---------------------|
| 125  | 23230    | Woolen & worsted fabrics            | 2.0               |                     |
| 126  | 39909    | Miscellaneous manufacturing         | 2.0               |                     |
| 127  | 90216    | Manufactures of metal               | 2.0               |                     |
| 128  | 88002    | Other scrap                         | 1.8               |                     |
| 129  | 31924    | Pesticide                           | 1.7               |                     |
| 130  | 34120    | Rolled steel                        | 1.7               |                     |
| 131  | 36031    | Farming machines                    | 1.6               |                     |
| 132  | 20223    | Preserved sea food                  | 1.5               |                     |
| 133  | 90208    | Animal & vegetable oils & fats      | 1.5               |                     |
| 134  | 31202    | Hats                                | 1.4               |                     |
| 135  | 33999    | Other clay & stone products         | 1.4               |                     |
| 136  | 35022    | Tool                                | 1.4               |                     |
| 137  | 38120    | Steel shipbuilding & repairing      | 1.3               |                     |
| 138  | 21909    | Miscellaneous liquors               | 1.2               |                     |
| 139  | 36034    | Special industry machine            | 1.2               |                     |
| 140  | 23222    | Staple fibre fabrics                | 1.1               |                     |
| 141  | 26002    | Metallic furnitures                 | 1.1               |                     |
| 142  | 31181    | Chemical fertilizer                 | 0.8               |                     |
| 143  | 39112    | Measuring instrument                | 0.7               |                     |
| 144  | 20910    | Noodle & vermicelli                 | 0.6               |                     |
| 145  | 15000    | Raw salt                            | 0.5               |                     |
| 146  | 20219    | Other processed fruits & vegetables | 0.5               |                     |
| 147  | 90203    | Wood, lumber & cork                 | 0.5               |                     |
| 148  | 22000    | Cigarette                           | 0.4               |                     |
| 149  | 19900    | Miscellaneous non-metallic minerals | 0.3               |                     |
| 150  | 20103    | Dairy products                      | 0.3               |                     |
| 151  | 20790    | Miscellaneous seasoning             | 0.3               |                     |
| 152  | 31141    | Explosives                          | 0.3               |                     |
| 153  | 33102    | Fire clay products                  | 0.3               |                     |
| 154  | 01141    | Cotton & hemp                       | 0.2               |                     |
| 155  | 20994    | Tea                                 | 0.2               |                     |
| 156  | 23221    | Silk fabrics                        | 0.2               |                     |
| 157  | 32900    | Coal products                       | 0.2               |                     |
| 158  | 21200    | Beer                                | 0.1               |                     |
| 159  | 23210    | Cotton fabrics                      | 0.1               |                     |
| 160  | 36011    | Prime mover & boiler                | 0.1               |                     |
| 161  | 88001    | Metal scrap                         | 0.1               |                     |
| 162  | 90204    | Pulp                                | 0.1               |                     |
| 163  | 01111    | Rice                                | —                 |                     |
| 164  | 01112    | Barley & wheat                      | —                 |                     |
| 165  | 01123    | Potatoes                            | —                 |                     |
| 166  | 01142    | Perilla frutescens & castor beans   | —                 |                     |
| 167  | 01151    | Dairy cattle                        | —                 |                     |
| 168  | 01159    | Other livestock & poultry           | —                 |                     |
| 169  | 01170    | Cocoon                              | —                 |                     |
| 170  | 04120    | Laver & oyster                      | —                 |                     |
| 171  | 11100    | Anthracite                          | —                 |                     |
| 172  | 11200    | Peat & sub-bituminous coal          | —                 |                     |
| 173  | 12100    | Iron ore                            | —                 |                     |
| 174  | 12210    | Tungsten ore                        | —                 |                     |
| 175  | 12220    | Manganese ore                       | —                 |                     |
| 176  | 12230    | Gold & silver ores                  | —                 |                     |
| 177  | 12240    | Copper ore                          | —                 |                     |
| 178  | 12250    | Lead ore                            | —                 |                     |
| 179  | 12260    | Zinc ore                            | —                 |                     |
| 180  | 12290    | Miscellaneous metallic ores         | —                 |                     |
| 181  | 13000    | Rare element ores                   | —                 |                     |
| 182  | 19100    | Graphite                            | —                 |                     |
| 183  | 19200    | Kaolin                              | —                 |                     |
| 184  | 19400    | Fluorspar                           | —                 |                     |
| 185  | 19500    | Lime stone                          | —                 |                     |
| 186  | 20211    | Canned fruits & vegetables          | —                 |                     |
| 187  | 20221    | Canned sea food                     | —                 |                     |
| 188  | 20310    | Grain milling                       | —                 |                     |
| 189  | 20320    | Wheat & flour                       | —                 |                     |
| 190  | 20500    | Sugars                              | —                 |                     |



| Rank | I-O Code | Item   | $t_1^2$ | Share of import (%) |
|------|----------|--|---------|---------------------|
| 191  | 20800    | Ice  | —       | (15.34)             |
| 192  | 20930    | Bean curd  | —       |                     |
| 193  | 20940    | Bean sprout                                      | —       |                     |
| 194  | 20991    | Maltose  | —       |                     |
| 195  | 20992    | Edible salt                                      | —       |                     |
| 196  | 20993    | Edible vegetable oils                            | —       |                     |
| 197  | 21103    | Distilled spirits                                | —       |                     |
| 198  | 21300    | Clean & unrefined rice wine                      | —       |                     |
| 199  | 21400    | Sake   | —       |                     |
| 200  | 21901    | Fruit wine                                       | —       |                     |
| 201  | 23141    | Hemp & flax yarn                                 | —       |                     |
| 202  | 23142    | Staple fibre yarn                                | —       |                     |
| 203  | 23910    | Straw seats                                      | —       |                     |
| 204  | 23920    | Straw bags & rope                                | —       |                     |
| 205  | 23991    | Cotton   | —       |                     |
| 206  | 25100    | Saw mills  | —       |                     |
| 207  | 27170    | Window paper                                     | —       |                     |
| 208  | 27180    | Asphalt roofing & water proof paper              | —       |                     |
| 209  | 30002    | Rubber shoes                                     | —       |                     |
| 210  | 31111    | Ammonia  | —       |                     |
| 211  | 31112    | Sulfuric acid                                    | —       |                     |
| 212  | 31114    | Calcium carbide                                  | —       |                     |
| 213  | 31189    | Other fertilizer                                 | —       |                     |
| 214  | 31921    | Soap   | —       |                     |
| 215  | 31992    | Toilet articles                                  | —       |                     |
| 216  | 32210    | Briquet  | —       |                     |
| 217  | 33400    | Cement   | —       |                     |
| 218  | 33500    | Cement products                                  | —       |                     |
| 219  | 33991    | Carbon products                                  | —       |                     |
| 220  | 33992    | Asbestos products                                | —       |                     |
| 221  | 34111    | Pig iron   | —       |                     |
| 222  | 34132    | Cast steel                                       | —       |                     |
| 223  | 34133    | Cast iron pipe                                   | —       |                     |
| 224  | 34229    | Other nonferrous metals                          | —       |                     |
| 225  | 35011    | Gate   | —       |                     |
| 226  | 36021    | Working machines                                 | —       | (15.34)             |
| 227  | 36022    | Metal processing machines                        | —       |                     |
| 228  | 36032    | Mining & construction machines                   | —       |                     |
| 229  | 36041    | General purpose industrial machine and equipment | —       |                     |
| 230  | 37011    | Generator  | —       |                     |
| 231  | 37033    | Machine for post and telegraph                   | —       |                     |
| 232  | 38110    | Ship motor                                       | —       |                     |
| 233  | 38130    | Wooden Shipbuilding & Repairing                  | —       |                     |
| 234  | 38400    | Motor vehicle repairing                          | —       |                     |
| 235  | 38901    | Other transport equipment                        | —       |                     |
| 236  | 39111    | Scientific instrument                            | —       |                     |
| 237  | 39300    | Precious metals & jewels                         | —       |                     |
| 238  | 39905    | Synthetic resin products                         | —       |                     |

Table XII.  $t_i^3$  Rankings

| Rank | I-O Code | Item                                 | $t_i^3$ | Share of import (%) |
|------|----------|--------------------------------------|---------|---------------------|
| 1    | 23130    | Woolen & worsted yarn                | 70.0    | (0.00)              |
| 2    | 24901    | Finished textile products            | 49.4    | (0.24)              |
| 3    | 23500    | Ropes & fishing nets                 | 47.9    |                     |
| 4    | 32300    | Petroleum products                   | 47.2    |                     |
| 5    | 21101    | Alcohol                              | 44.5    |                     |
| 6    | 23999    | Miscellaneous textile products       | 41.3    |                     |
| 7    | 23400    | Knitting mill products               | 41.2    |                     |
| 8    | 23222    | Staple fibre fabrics                 | 40.0    | (0.51)              |
| 9    | 20500    | Sugars                               | 39.8    |                     |
| 10   | 21901    | Fruit wine                           | 38.2    |                     |
| 11   | 31910    | Pharmaceutical preparation           | 29.5    | (0.15)              |
| 12   | 21200    | Beer                                 | 28.1    |                     |
| 13   | 21400    | Sake                                 | 27.8    |                     |
| 14   | 24300    | Wearing apparel & accessories        | 27.7    |                     |
| 15   | 20103    | Dairy products                       | 27.4    |                     |
| 16   | 39903    | Toys & sporting goods                | 22.4    | (1.97)              |
| 17   | 38510    | Bicycle & rear-car                   | 21.0    |                     |
| 18   | 23143    | Chemical fibre yarn                  | 20.0    |                     |
| 19   | 23224    | Chemical fibre fabrics               | 19.5    |                     |
| 20   | 20994    | Tea                                  | 16.3    |                     |
| 21   | 20999    | Other processed food                 | 16.1    | (1.97)              |
| 22   | 23240    | Hemp fabrics                         | 16.1    |                     |
| 23   | 31113    | Hydrochloric acid                    | 13.9    |                     |
| 24   | 31929    | Other chemical products              | 13.6    |                     |
| 25   | 31141    | Explosives                           | 12.0    |                     |
| 26   | 23221    | Silk fabrics                         | 11.4    | (24.52)             |
| 27   | 20920    | Starch                               | 10.9    |                     |
| 28   | 23141    | Hemp & flax yarn                     | 10.0    |                     |
| 29   | 23142    | Staple fibre yarn                    | 10.0    |                     |
| 30   | 29100    | Leather                              | 10.0    |                     |
| 31   | 31192    | Oxygen, acetylene & dry ice          | 10.0    | (24.52)             |
| 32   | 38300    | Motor vehicles                       | 10.0    |                     |
| 33   | 39300    | Precious metals & jewels             | 10.0    |                     |
| 34   | 39500    | Lacquerware                          | 10.0    |                     |
| 35   | 23110    | Cotton yarn                          | 9.9     |                     |
| 36   | 33210    | Plate glass                          | 9.9     | (24.52)             |
| 37   | 21909    | Miscellaneous liquors                | 9.7     |                     |
| 38   | 25200    | Plywood                              | 9.6     |                     |
| 39   | 26002    | Metallic furnitures                  | 9.2     |                     |
| 40   | 31115    | Soda products                        | 8.8     |                     |
| 41   | 35021    | Household metallic products          | 8.7     | (24.52)             |
| 42   | 31191    | Inorganic chemicals                  | 8.6     |                     |
| 43   | 31921    | Soap                                 | 8.6     |                     |
| 44   | 39907    | Accessories                          | 8.0     |                     |
| 45   | 37022    | Household electric appliance         | 7.5     |                     |
| 46   | 27210    | Wall, floor & window paper           | 7.1     | (24.52)             |
| 47   | 21300    | Clean & unrefined rice wine          | 6.8     |                     |
| 48   | 33500    | Cement products                      | 6.3     |                     |
| 49   | 88001    | Metal scrap                          | 6.2     |                     |
| 50   | 88002    | Other scrap                          | 5.9     |                     |
| 51   | 27240    | Notebook & paper for office use      | 5.6     | (24.52)             |
| 52   | 33400    | Cement                               | 5.0     |                     |
| 53   | 21103    | Distilled spirits                    | 4.5     |                     |
| 54   | 27120    | Newsprint, woodfree & kraft paper    | 4.4     |                     |
| 55   | 27230    | Paper case & bag                     | 4.3     |                     |
| 56   | 20996    | Malt                                 | 4.2     |                     |
| 57   | 23210    | Cotton fabrics                       | 4.2     | (24.52)             |
| 58   | 01130    | Fruits                               | 4.0     |                     |
| 59   | 34160    | Galvanized steel pipe                | 4.0     |                     |
| 60   | 34230    | Non-ferrous metallic rolled products | 3.5     |                     |

| Rank | I-O Code | Item                                | $t_1^3$ | Share of import (%) |
|------|----------|-------------------------------------|---------|---------------------|
| 61   | 20219    | Other processed fruits & vegetables | 3.4     |                     |
| 62   | 29200    | Leather products                    | 3.4     |                     |
| 63   | 39906    | Stationery                          | 3.4     |                     |
| 64   | 33220    | Glass products                      | 3.2     |                     |
| 65   | 37021    | Electric bulb & fluorescent tube    | 3.0     |                     |
| 66   | 27160    | Manila board & plane board          | 2.5     |                     |
| 67   | 36061    | Sewing machines                     | 2.4     |                     |
| 68   | 20101    | Slaughtering                        | 2.3     |                     |
| 69   | 26001    | Wood-made furnitures                | 2.1     |                     |
| 70   | 30001    | Rubber products                     | 2.1     |                     |
| 71   | 21600    | Soft drinks                         | 1.5     |                     |
| 72   | 31121    | Basic organic chemicals             | 1.4     |                     |
| 73   | 39904    | Musical instruments                 | 1.4     |                     |
| 74   | 33300    | Pottery                             | 1.1     |                     |
| 75   | 31130    | Dyestuffs                           | 0.9     |                     |
| 76   | Q1141    | Cotton & hemp                       | 0.5     |                     |
| 77   | 35012    | Structural metal products           | 0.3     |                     |
| 78   | 01111    | Rice                                | —       |                     |
| 79   | 01112    | Barley & wheat                      | —       |                     |
| 80   | 01121    | Pulses                              | —       |                     |
| 81   | 01122    | Miscellaneous cereals               | —       |                     |
| 82   | 01123    | Potatoes                            | —       |                     |
| 83   | 01124    | Vegetables                          | —       |                     |
| 84   | 01142    | Perilla frutescens & castor beans   | —       |                     |
| 85   | 01143    | Tobacco & peppermint                | —       |                     |
| 86   | 01144    | Ginseng & pyrethrum flower          | —       |                     |
| 87   | Q1145    | Appreciation plant                  | —       |                     |
| 88   | 01149    | Miscellaneous special crops         | —       |                     |
| 89   | 01151    | Dairy cattle                        | —       |                     |
| 90   | 01152    | Hens, duck, turkey & geese          | —       |                     |
| 91   | 01153    | Pig                                 | —       |                     |
| 92   | 01159    | Other livestock & poultry           | —       |                     |
| 93   | Q1170    | Cocoons                             | —       |                     |
| 94   | 02111    | Forest                              | —       |                     |
| 95   | 02112    | Forest products                     | —       |                     |
| 96   | 02120    | Charcoal & firewood                 | —       |                     |
| 97   | Q4110    | Fishery                             | —       |                     |
| 98   | 04120    | Laver & oyster                      | —       |                     |
| 99   | 11100    | Anthracite                          | —       |                     |
| 100  | 11200    | Peat & sub-bituminous coal          | —       |                     |
| 101  | 12100    | Iron ores                           | —       |                     |
| 102  | 12210    | Tungsten ores                       | —       |                     |
| 103  | 12220    | Manganese ores                      | —       |                     |
| 104  | 12230    | Gold & silver ores                  | —       |                     |
| 105  | 12240    | Copper ores                         | —       |                     |
| 106  | 12250    | Lead ores                           | —       |                     |
| 107  | 12260    | Zinc ores                           | —       |                     |
| 108  | 12290    | Miscellaneous metallic ores         | —       |                     |
| 109  | 13000    | Rare element ores                   | —       |                     |
| 110  | 14000    | Sand & stone                        | —       |                     |
| 111  | 15000    | Raw salt                            | —       |                     |
| 112  | 19100    | Graphite                            | —       |                     |
| 113  | 19200    | Kaolin                              | —       |                     |
| 114  | 19300    | Talc                                | —       |                     |
| 115  | 19400    | Fluorspar                           | —       |                     |
| 116  | 19500    | Lime stone                          | —       |                     |
| 117  | 19900    | Miscellaneous non-metallic minerals | —       |                     |
| 118  | 20102    | Canned & processed meat             | —       |                     |
| 119  | 20211    | Canned fruits & vegetables          | —       |                     |
| 120  | 20221    | Canned sea food                     | —       |                     |
| 121  | 20222    | Sea food                            | —       |                     |
| 122  | 20223    | Preserved sea food                  | —       |                     |
| 123  | 20310    | Grain milling                       | —       |                     |
| 124  | 20320    | Wheat & flour                       | —       |                     |
| 125  | 20400    | Bread & confectioneries             | —       |                     |
| 126  | 20600    | Sugar confectioneries               | —       |                     |

| Rank | I-O Code | Item   | $\frac{I^3}{I_1}$ | Share of import (%) |
|------|----------|--|-------------------|---------------------|
| 127  | 20710    | Soy sauce & bean paste                           | —                 | (72.61)             |
| 128  | 20790    | Miscellaneous seasoning                          | —                 |                     |
| 129  | 20800    | Ice  | —                 |                     |
| 130  | 20910    | Noodle & vermicelli                              | —                 |                     |
| 131  | 20930    | Bean curd  | —                 |                     |
| 132  | 20940    | Bean sprout                                      | —                 |                     |
| 133  | 20991    | Maltose  | —                 |                     |
| 134  | 20992    | Edible salt                                      | —                 |                     |
| 135  | 20993    | Edible vegetable oils                            | —                 |                     |
| 136  | 20995    | Combined feed                                    | —                 |                     |
| 137  | 22000    | Cigarette  | —                 |                     |
| 138  | 23120    | Raw silk   | —                 |                     |
| 139  | 23230    | Woolen & worsted fabrics                         | —                 |                     |
| 140  | 23910    | Straw seats                                      | —                 |                     |
| 141  | 23900    | Straw bags & rope                                | —                 |                     |
| 142  | 23991    | Cotton   | —                 |                     |
| 143  | 24111    | Leathers shoes                                   | —                 |                     |
| 144  | 25100    | Saw mills  | —                 |                     |
| 145  | 25300    | Wood box & tub                                   | —                 |                     |
| 146  | 25400    | Bamboo & cork products                           | —                 |                     |
| 147  | 25900    | Other wood products                              | —                 |                     |
| 148  | 27170    | Window paper                                     | —                 |                     |
| 149  | 27180    | Asphalt roofing & water proof paper              | —                 |                     |
| 150  | 28001    | Newspaper  | —                 |                     |
| 151  | 28009    | Other printing & publishing                      | —                 |                     |
| 152  | 30002    | Rubber shoes                                     | —                 |                     |
| 153  | 31111    | Ammonia  | —                 |                     |
| 154  | 31112    | Sulfuric acid                                    | —                 |                     |
| 155  | 31114    | Calcium carbide                                  | —                 |                     |
| 156  | 31181    | Chemical fertilizer                              | —                 |                     |
| 157  | 31189    | Other fertilizer                                 | —                 |                     |
| 158  | 31201    | Oils   | —                 |                     |
| 159  | 31202    | Hats   | —                 |                     |
| 160  | 31300    | Paint  | —                 |                     |
| 161  | 31923    | Printing ink                                     | —                 |                     |
| 162  | 31924    | Pesticide  | —                 |                     |
| 163  | 31925    | Matches  | —                 |                     |
| 164  | 31992    | Toilet articles                                  | —                 |                     |
| 165  | 32210    | Briquet  | —                 |                     |
| 166  | 32900    | Coal products                                    | —                 |                     |
| 167  | 33101    | Structural clay products                         | —                 |                     |
| 168  | 33102    | Fire clay products                               | —                 |                     |
| 169  | 33930    | Polishing stone & paper                          | —                 |                     |
| 170  | 33991    | Carbon products                                  | —                 |                     |
| 171  | 33992    | Asbestos products                                | —                 |                     |
| 172  | 33999    | Other clay & stone products                      | —                 |                     |
| 173  | 34111    | Pig iron   | —                 |                     |
| 174  | 34112    | Crude steel                                      | —                 |                     |
| 175  | 34120    | Rolled steel                                     | —                 |                     |
| 176  | 34131    | Steel pipes                                      | —                 |                     |
| 177  | 34132    | Cast steel                                       | —                 |                     |
| 178  | 34133    | Cast iron pipe                                   | —                 |                     |
| 179  | 34151    | Forged steel                                     | —                 |                     |
| 180  | 34210    | Copper   | —                 |                     |
| 181  | 34229    | Other nonferrous metals                          | —                 |                     |
| 182  | 34250    | Nonferrous metallic cast products                | —                 |                     |
| 183  | 35011    | Gate   | —                 |                     |
| 184  | 35022    | Tool   | —                 |                     |
| 185  | 35023    | Miscellaneous metal products                     | —                 |                     |
| 186  | 36011    | Prime mover & boiler                             | —                 |                     |
| 187  | 36021    | Working machines                                 | —                 |                     |
| 188  | 36022    | Metal processing machines                        | —                 |                     |
| 189  | 36031    | Farming machines                                 | —                 |                     |
| 190  | 36032    | Mining & construction machines                   | —                 |                     |
| 191  | 36033    | Textile machines                                 | —                 |                     |
| 192  | 36034    | Special industry machine                         | —                 |                     |
| 193  | 36041    | General purpose industrial machine and equipment | —                 |                     |

| Rank | I-O Code | Item  | $I_1^3$ | Share of import (%) |
|------|----------|---|---------|---------------------|
| 194  | 36051    | Office machines   | —       |                     |
| 195  | 36070    | Machine parts   | —       |                     |
| 196  | 37011    | Generator   | —       |                     |
| 197  | 37012    | Transformer and socket                                  | —       |                     |
| 198  | 37013    | Electric motor  | —       |                     |
| 199  | 37014    | Other industrial electric machinery and equipment       | —       |                     |
| 200  | 37031    | Electric apparatus                                      | —       |                     |
| 201  | 37033    | Machine for post and telegraph                          | —       |                     |
| 202  | 37034    | Watt-meter  | —       |                     |
| 203  | 37035    | Electric copper wire and cable                          | —       |                     |
| 204  | 38110    | Ship motor  | —       |                     |
| 205  | 38120    | Steel shipbuilding and repairing                        | —       |                     |
| 206  | 38201    | Railroad equipment                                      | —       |                     |
| 207  | 38400    | Motor vehicle repairing                                 | —       |                     |
| 208  | 38901    | Other transport equipment                               | —       |                     |
| 209  | 39111    | Scientific instrument                                   | —       |                     |
| 210  | 39112    | Measuring instrument                                    | —       |                     |
| 211  | 39121    | Medical instrument                                      | —       |                     |
| 212  | 39211    | Optical instrument                                      | —       |                     |
| 213  | 39212    | Photographic materials                                  | —       |                     |
| 214  | 39122    | Sanitary materials                                      | —       |                     |
| 215  | 39701    | Watch   | —       |                     |
| 216  | 39901    | Umbrella & parasol                                      | —       |                     |
| 217  | 39902    | Bristle   | —       |                     |
| 218  | 39905    | Synthetic resin products                                | —       |                     |
| 219  | 39909    | Miscellaneous manufacturing                             | —       |                     |
| 220  | 38130    | Wooden shipbuilding and repairing                       | —       |                     |
| 221  | 90201    | Food (Div. 02, 05, 06, 07 of SITC)                      | —       |                     |
| 222  | 90202    | Crude rubber (Div. 23)                                  | —       |                     |
| 223  | 90203    | Wood lumber and cork (Div. 26)                          | —       |                     |
| 224  | 90204    | Pulp (Div. 25)  | —       |                     |
| 225  | 90205    | Textile fibres (Div. 26)                                | —       |                     |
| 226  | 90206    | Non-metallic mineral manufactures (Div. 22, 27, 29, 66) | —       |                     |
| 227  | 90207    | Coal & petroleum product (Div. 32 to 34)                | —       |                     |
| 228  | 90208    | Animal and vegetable oils & fats (Div. 41 to 43)        | —       |                     |
| 229  | 90909    | Chemicals (Div. 51 to 55)                               | —       |                     |
| 230  | 90210    | Plastic materials & artificial resins (Div. 58)         | —       |                     |
| 231  | 90211    | Rubber manufactures (Div. 62)                           | —       |                     |
| 232  | 90212    | Paper & manufactures thereof (Div. 64)                  | —       |                     |
| 233  | 90213    | Textile yarn and fibres (Div. 67)                       | —       |                     |
| 234  | 90214    | Iron & steel (Div. 67)                                  | —       |                     |
| 235  | 90215    | Non-ferrous metals (Div. 68)                            | —       |                     |
| 236  | 90216    | Manufactures of metal (Div. 69)                         | —       |                     |
| 237  | 90217    | Machinery & transport equipment (Div. 71 to 73)         | —       |                     |
| 238  | 90218    | Miscellaneous manufactured articles (Div. 81, 86, 89)   | —       |                     |

Table XIII. Value Added Ratio

| I-O Code | Item                                | v <sub>j</sub> |
|----------|-------------------------------------|----------------|
| 01111    | Rice                                | 0.8718         |
| 01112    | Barley & wheat                      | 0.6064         |
| 01121    | Pulses                              | 0.8237         |
| 01122    | Miscellaneous & cereals             | 0.7820         |
| 01123    | Potatoes                            | 0.8473         |
| 01124    | Vegetables                          | 0.8825         |
| 01130    | Fruits                              | 0.5231         |
| 01141    | Cotton & hemp                       | 0.8036         |
| 01142    | Perilla frutesens & castor beans    | 0.6472         |
| 01143    | Tobacco & peppermint                | 0.7762         |
| 01144    | Ginseng & Pyrethrum flower          | 0.5236         |
| 01145    | Appreciation plant                  | 0.6245         |
| 01149    | Miscellaneous special crops         | 0.6529         |
| 01151    | Dairy cattle                        | 0.6740         |
| 01152    | Hen, duck, turkey & geese           | 0.3179         |
| 01153    | Pig                                 | 0.5526         |
| 01159    | Other livestock poultry             | 0.8157         |
| 01170    | Cocoon                              | 0.2835         |
| 02111    | Forest                              | 0.6170         |
| 02112    | Forest products                     | 0.9598         |
| 02120    | Charcoal & firewood                 | 0.9258         |
| 04110    | Fishery                             | 0.7451         |
| 04120    | Laver & oyster                      | 0.6530         |
| 11100    | Anthracite                          | 0.7839         |
| 11200    | Peat & sub-bituminous coal          | 0.8721         |
| 12100    | Iron ore                            | 0.9102         |
| 12210    | Tungsten ore                        | 0.6968         |
| 12220    | Manganese ore                       | 0.9715         |
| 12230    | Gold & silver ores                  | 0.7364         |
| 12240    | Copper ore                          | 0.5340         |
| 12250    | Lead ore                            | 0.7379         |
| 12260    | Zinc ore                            | 0.5679         |
| 12290    | Miscellaneous metallic ores         | 0.7688         |
| 15000    | Raw salt                            | 0.8293         |
| 13000    | Rare element ores                   | 0.4546         |
| 14000    | Sand & stone                        | 0.8725         |
| 19100    | Graphite                            | 0.7218         |
| 19200    | Kaolin                              | 0.9697         |
| 19300    | Talc                                | 0.7192         |
| 19400    | Fluorspar                           | 0.8738         |
| 19500    | Lime stone                          | 0.8021         |
| 19900    | Miscellaneous non-metallic minerals | 0.8771         |
| 20101    | Slaughtering                        | 0.2993         |
| 20102    | Canned & Processed meat             | 0.2641         |
| 20103    | Dairy products                      | 0.3213         |
| 20211    | Canned fruits & vegetables          | 0.4191         |
| 20219    | Other processed fruits & vegetables | 0.3376         |
| 20221    | Canned seafood                      | 0.4359         |
| 20222    | Sea food                            | 0.3533         |
| 20223    | Preserved seafood                   | 0.3113         |
| 20310    | Grain milling                       | 0.8753         |
| 20320    | Wheat flour                         | 0.2826         |
| 20400    | Bread & confectioneries             | 0.3421         |
| 20500    | Sugars                              | 0.5541         |
| 20600    | Sugar confectioneries               | 0.3551         |
| 20710    | Soy sauce & bean paste              | 0.3751         |
| 20790    | Miscellaneous seasoning             | 0.4352         |

| I-O Code | Item                                | V <sub>j</sub> |
|----------|-------------------------------------|----------------|
| 20800    | Ice                                 | 0.8920         |
| 20910    | Noodle & vermicelli                 | 0.1829         |
| 20920    | Starch                              | 0.5250         |
| 20930    | Bean curd                           | 0.3095         |
| 20940    | Bean sprout                         | 0.3280         |
| 20991    | Maltose                             | 0.4258         |
| 20992    | Edible salt                         | 0.5074         |
| 20993    | Edible vegetable oils               | 0.3492         |
| 20994    | Tea                                 | 0.5772         |
| 20995    | Combined feed                       | 0.2857         |
| 20996    | Malt                                | 0.5064         |
| 20999    | Other processed food                | 0.4417         |
| 21101    | Alcohol                             | 0.5765         |
| 21103    | Distilled spirits                   | 0.3873         |
| 21200    | Beer                                | 0.7335         |
| 21300    | Clean & unrefined rice wine         | 0.4902         |
| 21400    | Sake                                | 0.6363         |
| 21600    | Soft drinks                         | 0.3751         |
| 21901    | Fruit wine                          | 0.4155         |
| 21909    | Miscellaneous liquors               | 0.3636         |
| 22000    | Cigarette                           | 0.7266         |
| 23110    | Cotton yarn                         | 0.3656         |
| 23120    | Raw silk                            | 0.2919         |
| 23130    | Woolen & worsted yarn               | 0.6220         |
| 23141    | Hemp & flax yarn                    | 0.3939         |
| 23142    | Staple fibre yarn                   | 0.4908         |
| 23143    | Chemical fibre yarn                 | 0.3979         |
| 23210    | Cotton fabrics                      | 0.1757         |
| 23221    | Silk fabrics                        | 0.5736         |
| 23230    | Woolen & worsted fabrics            | 0.6935         |
| 23240    | Hemp fabrics                        | 0.4737         |
| 23222    | Staple fibre fabrics                | 0.4370         |
| 23224    | Chemical fibre fabrics              | 0.4878         |
| 23400    | Knitting mill product               | 0.4073         |
| 23500    | Ropes & fishing nets                | 0.3864         |
| 23910    | Straw seats                         | 0.3123         |
| 23920    | Straw bags & ropes                  | 0.6050         |
| 23991    | Cotton                              | 0.3062         |
| 23999    | Miscellaneous textile products      | 0.6057         |
| 24901    | Finished textile products           | 0.3898         |
| 24300    | Wearing apparel & accessory         | 0.3265         |
| 25100    | Sawmills                            | 0.4360         |
| 25200    | Plywood                             | 0.4370         |
| 25300    | Wood box & tub                      | 0.3938         |
| 25400    | Bamboo & cork products              | 0.5198         |
| 25900    | Other wood products                 | 0.5689         |
| 26001    | Wood-made furnitures                | 0.4170         |
| 26002    | Metallic furnitures                 | 0.4669         |
| 27120    | Newsprint, woodfree & kraft paper   | 0.4723         |
| 27160    | Manila board & plane board          | 0.3722         |
| 27170    | Window paper                        | 0.5482         |
| 27180    | Asphalt roofing & water proof paper | 0.3255         |
| 27210    | Wall, floor & window paper          | 0.4757         |
| 27230    | Paper case & bag                    | 0.4007         |
| 27240    | Notebook & paper for office use     | 0.3483         |
| 28001    | Newspaper                           | 0.5954         |
| 28009    | Other printing & publishing         | 0.5895         |
| 29100    | Leather                             | 0.4403         |
| 24111    | Leather shoes                       | 0.3974         |
| 29200    | Leather products                    | 0.3808         |
| 30001    | Rubber products                     | 0.3988         |

| I-O Code | Item                                 | v' <sub>j</sub> |
|----------|--------------------------------------|-----------------|
| 30002    | Rubber shoes                         | 0.4368          |
| 31111    | Ammonia                              | 0.8327          |
| 31112    | Sulfuric acid                        | 0.6369          |
| 31113    | Hydrochloric acid                    | 0.5825          |
| 31114    | Calcium carbide                      | 0.7756          |
| 31115    | Soda products                        | 0.4971          |
| 31121    | Basic organic chemicals              | 0.5701          |
| 31130    | Dyestuffs                            | 0.4119          |
| 31141    | Explosives                           | 0.4715          |
| 31181    | Chemical fertilizer                  | 0.7359          |
| 31189    | Other fertilizer                     | 0.2979          |
| 31191    | Inorganic chemicals                  | 0.5079          |
| 31192    | Oxygen, acetylene & dry ice          | 0.7217          |
| 31201    | Oils                                 | 0.3641          |
| 31202    | Fats                                 | 0.5463          |
| 31300    | Paint                                | 0.3595          |
| 31910    | Pharmaceutical preparation           | 0.6054          |
| 31921    | Soap                                 | 0.4008          |
| 31992    | Toilet articles                      | 0.5490          |
| 31923    | Printing ink                         | 0.4026          |
| 31924    | Pesticide                            | 0.5547          |
| 31925    | Matches                              | 0.4648          |
| 31929    | Other chemical products              | 0.4514          |
| 32210    | Briquet                              | 0.4905          |
| 32300    | Petroleum products                   | 0.4428          |
| 32900    | Coal products                        | 0.4495          |
| 33400    | Cement                               | 0.6615          |
| 33101    | Structural clay products             | 0.6869          |
| 33102    | Fire clay products                   | 0.6842          |
| 33500    | Cement products                      | 0.5160          |
| 33210    | Plate glass                          | 0.6695          |
| 33220    | Glass products                       | 0.5801          |
| 33300    | Pottery                              | 0.5342          |
| 33930    | Polishing stone & paper              | 0.5386          |
| 33991    | Carbon products                      | 0.6070          |
| 33992    | Asbestos products                    | 0.5895          |
| 33999    | Other clay & stone products          | 0.6530          |
| 34111    | Pig iron                             | 0.5565          |
| 34112    | Crude steel                          | 0.4072          |
| 34120    | Rolled steel                         | 0.2692          |
| 34131    | Steel pipes                          | 0.4784          |
| 34132    | Cast steel                           | 0.4696          |
| 34133    | Cast iron pipe                       | 0.5444          |
| 34151    | Forged steel                         | 0.4793          |
| 34160    | Galvanized steel pipe                | 0.3256          |
| 34210    | Copper                               | 0.3818          |
| 34229    | Other non-ferrous metals             | 0.4949          |
| 34230    | Non-ferrous metallic rolled products | 0.3113          |
| 34250    | Non-ferrous metallic cast products   | 0.3163          |
| 35011    | Gate                                 | 0.8760          |
| 35012    | Structural metal products            | 0.4239          |
| 35021    | Household metallic products          | 0.3954          |
| 35022    | Tool                                 | 0.5317          |
| 35023    | Miscellaneous metal products         | 0.4793          |
| 36011    | Prime mover & boiler                 | 0.5945          |
| 36021    | Working machines                     | 0.4227          |
| 36022    | Metal processing machines            | 0.5398          |
| 36031    | Farming machines                     | 0.3407          |
| 36032    | Mining & construction machines       | 0.4658          |
| 36033    | Textile machines                     | 0.5170          |
| 36034    | Special-industry machines            | 0.4342          |



| I-O Code | Item  | v' <sub>j</sub> |
|----------|---|-----------------|
| 36041    | General purpose industry machine & equipment    | 0.5060          |
| 36070    | Machine parts                                   | 0.6081          |
| 36051    | Office machines                                 | 0.7529          |
| 36061    | Sewing machines                                 | 0.5528          |
| 37011    | Generator                                       | 0.5042          |
| 37012    | Transformer & socket                            | 0.4400          |
| 37013    | Electric motor                                  | 0.4480          |
| 37014    | Other industrial electric machinery & equipment | 0.3436          |
| 37021    | Electric bulb & fluorescent tube                | 0.4396          |
| 37022    | Household electric appliance                    | 0.5360          |
| 37031    | Electric apparatus                              | 0.4200          |
| 37033    | Machine for post & telegraph                    | 0.4390          |
| 37034    | Watt-meter                                      | 0.5280          |
| 37035    | Electric copper wire & cable                    | 0.4028          |
| 38110    | Ship motor                                      | 0.4759          |
| 38120    | Steel ship-building & repairing                 | 0.6001          |
| 38130    | Wooden ship building & repairing                | 0.4916          |
| 38201    | Railroad equipment                              | 0.2656          |
| 38300    | Motor vehicles                                  | 0.4401          |
| 38400    | Motor vehicle repairing                         | 0.5917          |
| 38510    | Bicycle & rear-car                              | 0.5074          |
| 38901    | Other transport equipment                       | 0.5411          |
| 39111    | Scientific instrument                           | 0.4090          |
| 39112    | Measuring instrument                            | 0.6265          |
| 39121    | Medical instruments                             | 0.4992          |
| 39122    | Sanitary materials                              | 0.2844          |
| 39211    | Optical instrument                              | 0.6498          |
| 39212    | Photographic materials                          | 0.4492          |
| 39701    | Watch   | 0.5420          |
| 39300    | Precious metals & jewels                        | 0.2251          |
| 93500    | Lacquer ware                                    | 0.7658          |
| 39901    | Umbrella & parasol                              | 0.3802          |
| 39902    | Bristle   | 0.2324          |
| 39903    | Toys & sporting goods                           | 0.4523          |
| 39904    | Musical instruments                             | 0.4882          |
| 39905    | Synthetic resin products                        | 0.4003          |
| 39906    | Stationery                                      | 0.4771          |
| 39907    | Accessories                                     | 0.8196          |
| 39909    | Miscellaneous manufacturing                     | 0.4110          |